COAL AGE

Devoted to the Operating, Technical and Business Problems of the Coal Mining Industry

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Out of the Rut

DAMNED not so long ago as our worst functioning industry, bituminous coal leadership has ceased to sit complacent under the indictment. Solid achievement by forward-looking organizations is discrediting the sweeping condemnation. Underground mechanization, only a few short years ago the hobby of a small group of bold spirits unhampered by tradition or prejudice, has won national acceptance even though national adoption is yet to be worked out. Mechanical preparation, quickened by the increased tonnage loaded mechanically, is advancing still more rapidly.

NOTABLE among the achievements in this direction is the accomplishment of the Pittsburgh Coal Co. in modernizing preparation and sizing. This work, which first took concrete shape two years ago when an air-process plant was put into operation at Library, now reaches another climax in the new Champion, Warden and Banning coal-dressing and refining plants. At these latter units the central preparation plant idea so common in the anthracite region, where breakers handle the output of several mines, now finds practical large-scale application in bituminous operations.

WHILE this application is important from the standpoint of economical and continuous operation, it is only incidental to the larger objectives of a cleaning system which would be under chemical control to insure constant quality standards and sizing facilities which would make it possible to load out any size or mixture a buyer might want. These objectives are placed first because the conception of the entire program was synchronized with the conception of a sales program which would carry these new standards of preparation to the consumer in terms of specific performance.

EMPHASIS is placed upon this complete integration of operating and sales programs for the reason that it involves a radical shifting in viewpoint. Heretofore most of the engineering genius employed in mining has been devoted to an attack upon production costs. This attack must and will continue. But the integration in this instance means that value as measured by actual results in consumption rather than price is to be given the prominence its importance merits. Better selling is called upon to see that better engineering is properly rewarded.

THE EXECUTIVE VISION dominating the Pittsburgh program is a dramatic recognition of the fundamental changes which are taking place in the coal industry. The twilight of "just coal" is seen in the deepening shadows. Consumers, many of whom received their primary lessons in the fundamentals of combustion efficiency and fuel economy during the war, are graduating into the connoisseur class. Woe to the producer who does not sense this change and reconstruct his operating and his sales programs to meet the new conditions!

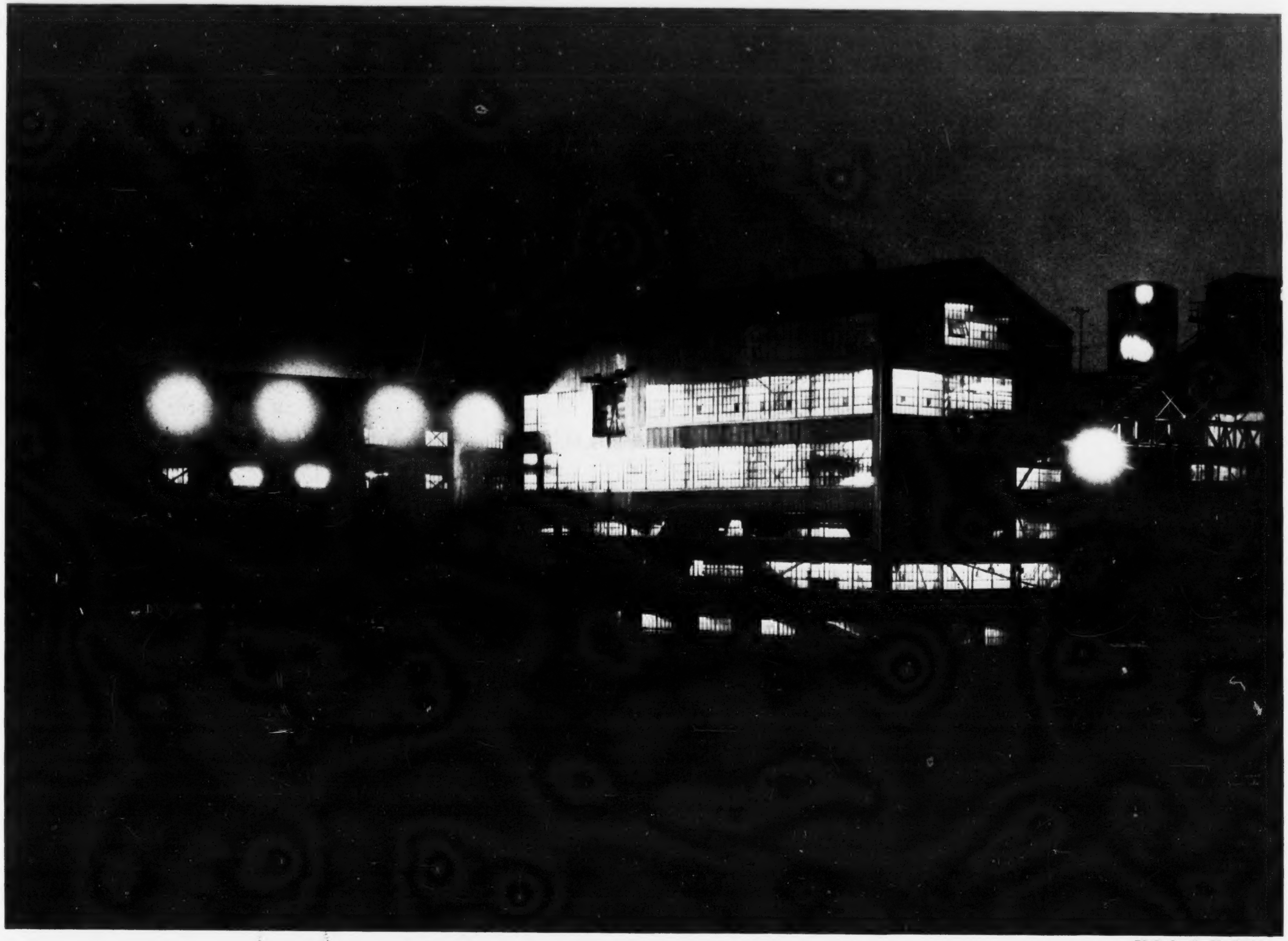
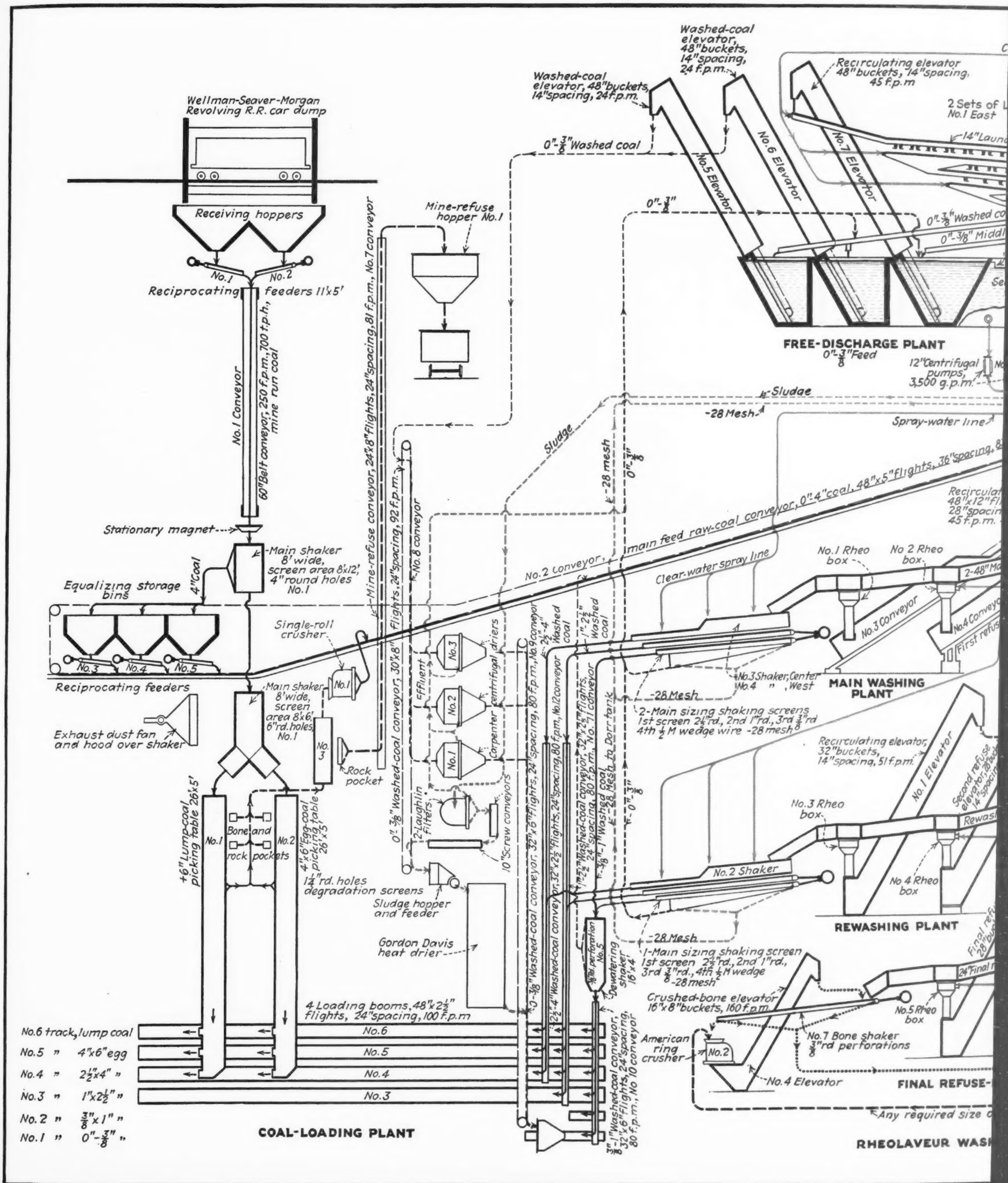
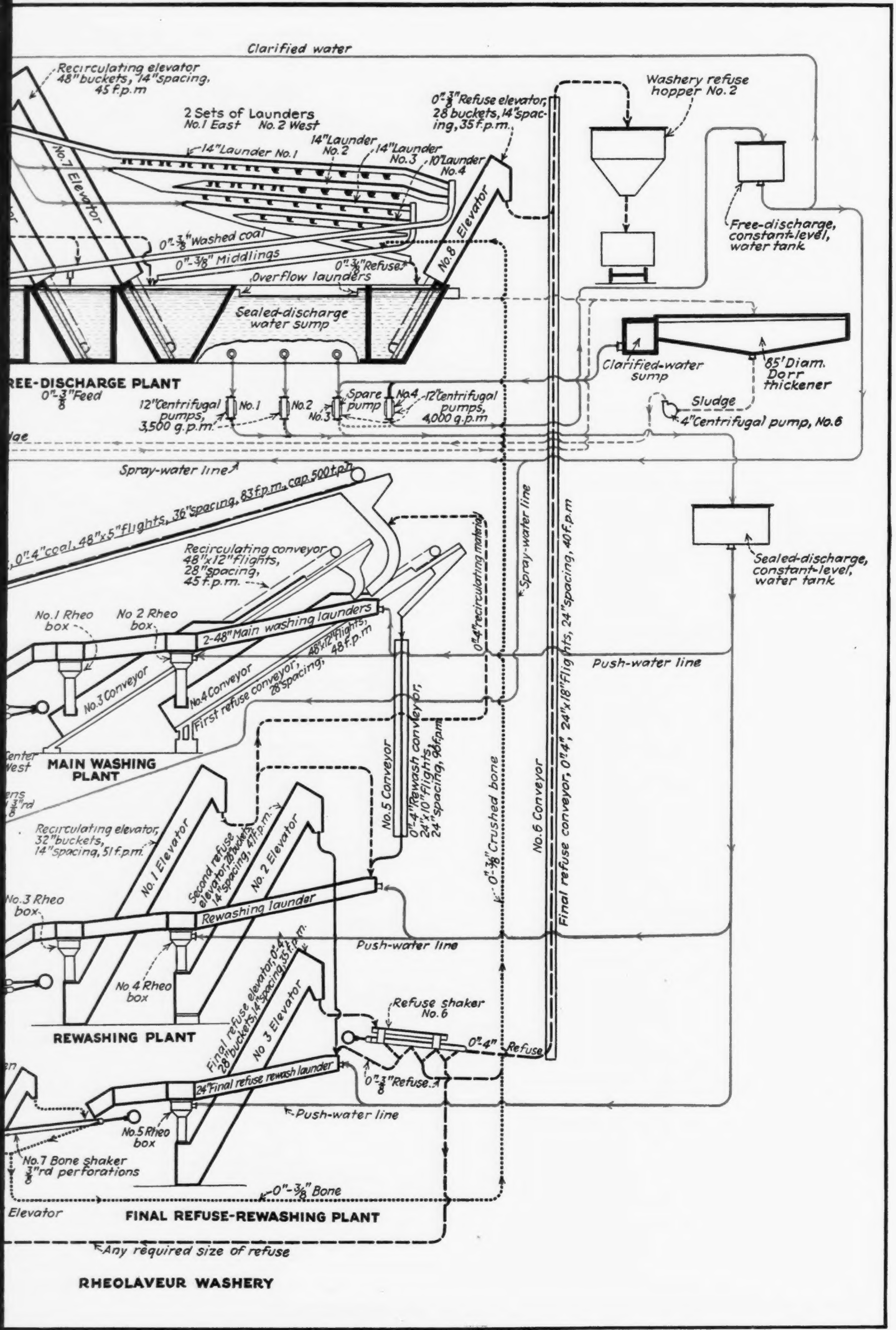


Photo by H. M. Lantz

Night at the Champion Cleaning Plant



Flow Sheet—Champion No. 1 Plant, Pittsburgh Coal Co



t, Pittsburgh Coal Co. (See p. 140)

Why the Pittsburgh Coal Co. Called for

A New Deal

on

PREPARATION

By C. E. Lesher

Executive Vice-President,
Pittsburgh Coal Co.

SCIENTIFIC preparation of coal for market by the Pittsburgh Coal Co. was undertaken on a large scale after study of the markets and extensive research of the coal itself over a period of several years. It has been the philosophy of the coal miner and of the coal producer that coal is coal. Nature put it into the ground and man's job is to dig it, safely and cheaply. Hence notable progress in mechanical cutting, loading and haulage, and hence rock-dusting, permissible explosives and safe illumination.

But to the man who uses it coal is no longer just coal. Buffeted from one source of supply to another—first by the exigencies of the war and later by turmoil in the coal fields—consumers have found by trial and experience that some coals are more suitable for particular uses than others. The coal consumer has become a discriminating buyer.

Hence fundamental changes are taking place in the coal industry, changes forced on the none too willing producer by economic pressure, and fundamental because they are upsetting the philosophy of a hundred years. It would be surprising that an industry with a history in which scarce one year out of ten favored the seller has so largely confined its efforts toward lower production costs and so little in the direction of better selling were it not that the struggle to survive has been so overpowering.

Discriminating buyers of coal now know more about coal than price. Price, of course, is a big factor, but next is suitability and performance. Every coal producer and every coal buyer knows, moreover, that there have always been differentials in the prices of coals, depending on the coal. What is happening now is that consumers are insisting on quality.

Appreciation of these facts led the Pittsburgh Coal Co. to a large-scale program of mechanical preparation of its coal. Research on mechanical cleaning of small sizes was begun in 1924, was most actively pursued in 1927 and is being continued. The coal from each section of each mine was subjected to sizing tests, float-and-sink tests, coking tests and laboratory analyses. Beginning with small samples, the work was enlarged to take in truckloads of coal in a test. Studies were made of the sections of the coal bed; peculiarities in samples were traced back to the source; a wide range of fact data was accumulated on which to base decisions as to proper type of treatment, results that were to be expected and costs of cleaning.

THE first plant for mechanical cleaning was put in operation in February, 1927, at the Montour No. 10 mine, at Library. This plant, using Arms air tables, was designed and erected by Roberts & Schaefer as contractors. Experience in the marketing of mechanically cleaned coal was rapidly accumulated; the acceptability of special sizing early demonstrated and within the year the output of this first cleaning plant was oversold. The flow of coal through this air plant has been simplified, cleaning results have been improved and the capacity of the plant is being steadily increased as the output of Montour No. 10 increases. Experience has fully justified the decision to use the dry process at this mine, and the customers' satisfaction with the product is seen in enhanced realization for the coal.

The next step was to provide mechanical cleaning for a group of five mines on the Montour R.R. For this group it was decided to use the Rhéo launder system. A plant could be erected at each mine, and that course was weighed against a central plant. In point of cost and speed of installation every factor favored the central plant. Added to this was the factor of permanency, since loss of tonnage from the working out of any mine could be replaced by a new mine. As the central-plant idea was developed additional advantages were disclosed, the most important of which relates to the "readiness to serve" feature.

Keeping in mind, first of all, the customer and his requirements, the central plant at Champion is designed and operated to meet every conceivable call for coal as to size and preparation and to furnish a product uni-

(Turn to page 150)

How Pittsburgh Coal Co. Is MODERNIZING *And Mechanizing Preparation and*

By J. B. Morrow
Manager of Preparation Pittsburgh Coal Co.

AT PRESENT the Pittsburgh Coal Co. has in operation or is building four mechanical preparation plants, three using the Rhéolaveur wet process for cleaning coal and one Arms dry tables. The combined annual capacity of these four plants is 9,250,000 tons.

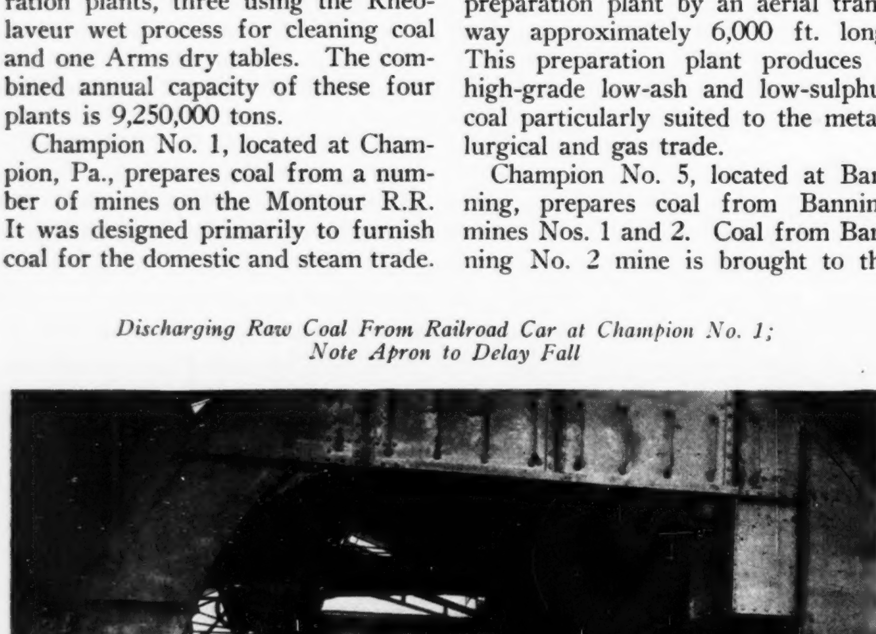
Champion No. 1, located at Champion, Pa., prepares coal from a number of mines on the Montour R.R. It was designed primarily to furnish coal for the domestic and steam trade.

Champion No. 3, the dry preparation plant, was built for that same purpose. It is located at the Montour No. 10 mine, Library, Pa., and draws all its coal from that operation.

Champion No. 4, located at Warden mine, prepares coal not only for that operation but for the Ocean mine also. Coal from the latter is transported to the storage bins of the preparation plant by an aerial tramway approximately 6,000 ft. long. This preparation plant produces a high-grade low-ash and low-sulphur coal particularly suited to the metallurgical and gas trade.

Champion No. 5, located at Banning, prepares coal from Banning mines Nos. 1 and 2. Coal from Banning No. 2 mine is brought to the preparation plant by an aerial tramway slightly over 6,000 ft. long. The plant is largely a duplicate of Champion No. 4 and prepares the same low-ash and low-sulphur coal for metallurgical and gas-making purposes.

Discharging Raw Coal From Railroad Car at Champion No. 1; Note Apron to Delay Fall



THE factors governing the design of the Champion No. 1 plant were:

(1) The desirability of receiving mine-run coals of varying qualities and varying percentages of sizes and separating them into a plus 4-in. product suitable for hand-picking and a minus 4-in. product which could be prepared mechanically.

(2) The desirability of being able to mix the products after cleaning in the same relative proportions as that in which they were received from the mine or to ship them separately as screened products or in any desired combination of sizes. The primary sizes now made are plus 6 in., 4x6 in., $2\frac{1}{2}$x4 in., 1x$2\frac{1}{2}$ in., $\frac{3}{8}$x1 in. and minus $\frac{3}{8}$ in. It should be understood that the exact sizes can be changed at any time within certain limits if so desired.

(3) The desirability of shipping a constant-ash product regardless of the variation in ash in the feed product from the individual mines.

(4) The desirability of erecting a type of plant in which low operating costs would be the principal consideration because the unlimited reserves of coal from the various mines along the Montour R.R. assure a long operating life for the plant.

(5) The desirability of departing from the conventional idea that a coal-preparation plant must be a dark and dingy establishment. It was believed that the extra expense neces-

d Cleaning to Meet the New Era in Scientific Coal Selling

sary to remove dust and obviate spillage would be more than compensated by the added efficiency of the operatives and the reduced cost of maintenance.

The coal from five mines is delivered to the plant by the Montour R.R. in standard open-top railroad cars which are switched to a raw-coal storage track located ahead of a Wellman-Seaver-Morgan rotary dump into which the cars are fed one by one by an endless rope-type reversible car haul with a maximum rope speed of 80 ft. per minute. The rotary dump is of a platen and apron type and so designed that when the car is tilted the contents spill onto the apron, which holds it until the mechanism is further revolved, at which time it lowers the coal into the hopper under the dump with minimum breakage. The hopper underneath the dump also was designed so as to further assist in minimizing breakage. The rotary dump has a capacity of approximately 20 cars per hour and is capable of handling cars of from 40 to 90 tons capacity.

Coal is fed from the hopper of the rotary dump to a 60-in. belt conveyor by two 11x5-ft. reciprocating pan-type feeders with an hourly capacity of 700 tons. The belt conveyor, which is inclined at an angle of 19 deg. to the horizontal, operates at a speed of 250 ft. per minute. It can deliver over 700 tons of coal per hour to the main shakers. To prevent the conveyor reversing when loaded, a solenoid-operated band brake is provided which sets upon failure of power.

Any tramp iron that may be in the raw coal is removed by a 65-in. lifting magnet located over the discharge end of the main-belt feed conveyor. It has proved both efficient and advantageous, having removed a large quantity of usable material such as machine bits, bolts, nuts, coupling pins and links as well as scrap iron.

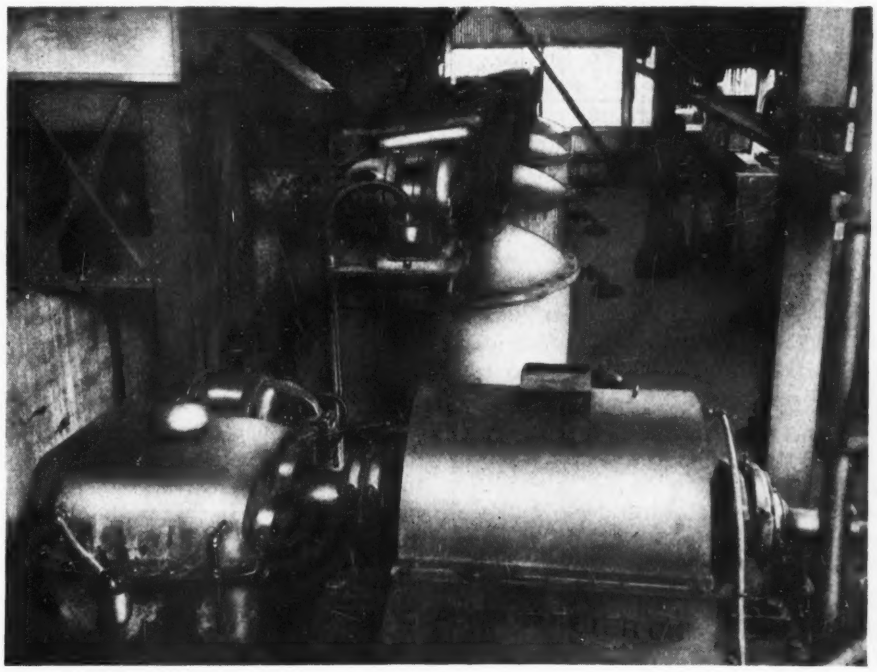
The belt conveyor feeds the run-of-mine coal onto a shaking screen of Allen & Garcia Co. reciprocating pendulum-hanger two-leaf type. The first screen deck over which the coal passes is fitted with 4-in. round-hole perforated plate and thereby the minus 4-in. coal is removed and directed on one of three equalizing, or raw-coal storage, bins. The second deck is fitted with 6-in. lip screens by which the plus 4-in. coal is separated into plus 6-in. and 4x6-in. sizes. These last two sizes are directed from the end of the screen onto two primary parallel shaking picking tables.

Hand pickers remove all material which might in any way affect the quality of the plus 4-in. coal regardless of the fact that the material so removed may contain coal values. The material picked from these primary picking tables is sent to a secondary picking table. Here the pure rock may be picked off and sent to the dry-refuse disposal bin or all the material on this table may be passed to a crusher to be reduced to a minus 4-in. size and sent to the washing plant with the feed coal from the minus 4-in. raw-coal storage bins. Thus any coal lost by hand picking is recovered.

The hand-picked plus 4-in. coal after passing over the primary picking tables travels over a small section of perforated plates which act as degradation screens and then onto shaking chutes, which are an integral part of the picking tables, from which it may be loaded onto any one of three loading booms.

Storage, or equalizing, bins are provided between the main screens and

Sludge Filter and Fine-Coal Centrifugal Driers Removing Water in Champion No. 4 Plant



the cleaning plant, permitting the operation of the cleaning plant for a short time independent of the dump or the operation of the dump during an interruption of the cleaning plant. The storage bins which were installed under the main shakers have a capacity of approximately 400 tons. To prevent breakage the minus 4-in. coal is lowered into these bins by ladder-type lowering chutes. The top strand of the main flight conveyor which feeds the minus 4-in. coal to the cleaning plant acts as a raw-coal distributing conveyor on its return flight and distributes the minus 4-in. raw coal to any of the three parts of the storage bin. From these bins the coal to be cleaned is fed onto a 48-in. drag flight conveyor by three reciprocating pan-type feeders, each of which has a capacity of 500 tons per hour.

The flight conveyor feeding the plant has a capacity of over 500 tons per hour and is set at an angle of 31 deg. to the horizontal. It delivers the coal to be cleaned to two primary Rhéolaveur launders operating in parallel, each of which is equipped with two Rhéo boxes. The first set of Rhéo boxes over which the coal passes, after primary classification, removes practically all of the refuse, some of the middling products and some of the fine coal. These materials are dropped into the sealed boot of the No. 1 conveyor and after dewatering are delivered to the re-treating launder.

The material which passes over the first boxes is then reclassified and passes over the second boxes which remove any slate which did not fall in the first boxes, together with middling products and some fine coal. This material drops into the No. 2 sealed-boot conveyor and is delivered back into the cleaning launders. This increases the quantity of middlings normally present and thus acts as a regulating product, thereby making it easier to separate the refuse from the coal.

AFTER passing over these second boxes in the cleaning launders the coal and water is fed onto two dewatering and sizing shaker screens of the flexible wood-hanger type. They are equipped with three decks and make the following sizes: 2½x4-in. coal over the top deck, 1x2½-in. coal over the second deck, ⅜x1-in. coal over the bottom deck and minus ⅜-in. coal through that deck. Strong sprays of clear water on these screens wash off fine particles of coal, thus aiding in dewatering and assuring a lower resultant moisture. In order to further dewater the ⅜x1-in. coal, it is passed onto another shaker operating at right angles to the main shakers.

The materials sent to the re-treating plant are passed down two-box launders, where they are classified. Continuing along the launder they pass over No. 1 box of this plant. The refuse and some of the heavier bone, particularly that consisting of laminations of slate and coal, are removed. Some fine coal also accompanies these materials. The bucket elevator located below this box delivers this material to a single-box refuse re-treating plant. This box permits the bone to pass over into an American ring crusher, where it is all broken down to pass a ⅜-in. round-hole screen. It is then sent to the fine-coal cleaning plant.

THE coal which is removed from the product fed to the two-box re-treating launder passes onto a shaker screen similar to the three-deck shaking screens last described. This product is mixed with the product from the other two shakers, forming the cleaned coal, which is sent out from the plant in the sizes mentioned. All the water and minus ⅜-in. coal which has passed through the bottom deck of the shaker screens is led to a concrete tank or boot, where it is settled and removed by a dewatering elevator for feeding to a fine-coal cleaning plant called a Rhéolaveur free-discharge plant, in which all coal of a size less than ⅜ in. is given its final cleaning.

After it is cleaned this fine coal passes, with the water used in the operation, to two concrete tanks, or boots, where it is again settled and removed by two dewatering elevators and from these fed into a scraper conveyor line. This in turn discharges the coal into one or more of the three Carpenter centrifugal driers. Here the moisture in the minus ⅜-in. coal is reduced to 6 per cent and under. The coal is then dropped onto another scraper conveyor and sent to the mixing and loading plant.

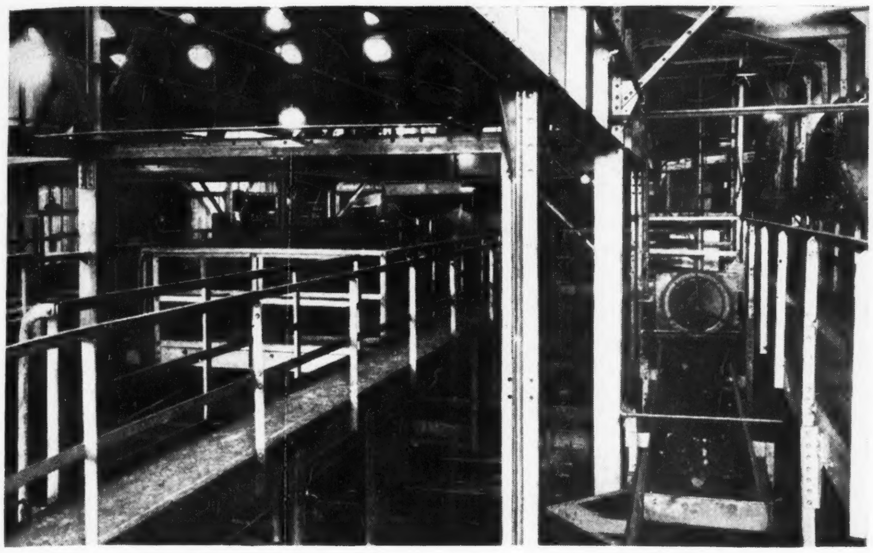
The refuse from the free-discharge or fine-coal plant, together with its water, passes to another concrete boot and is removed by a dewatering elevator. It is discharged into the refuse conveyor and sent to the refuse pocket. The refuse from the sealed discharge (plus ⅜-in.) plant after removal from the Rhéo-box in the slate re-treating plant is elevated to a screen where the minus ⅜-in. material is removed and sent to the free-discharge plant and treated again with the main minus ⅜-in. feed. The plus ⅜-in. refuse which passes over the screen is fed to the same conveyor as the small refuse and also is delivered to the refuse pocket. From this pocket the refuse is discharged into side-dump railroad cars by which it is removed from the plant.

Four loading booms and two loading chutes deliver the coal to the cars on six tracks. Each size of coal from the shaker screens of the cleaning plant is loaded onto a low flight cross-conveyor, great care being used to prevent degradation at the point where the coal is discharged onto these conveyors. The loading booms are extended sufficiently far back so that each of the cross conveyors passes over each of the loading booms, and at the point where they cross them a gate is provided in the bottom of the conveyor pans. By this means any portion or all of any size of coal can be dropped into any one or more of the loading booms. Thus any size or combination of sizes can be loaded.

To reduce further the moisture in the coal coming from the cleaning plant four provisions have been made on the cross conveyors: (1) the cross conveyor pans at intervals are furnished with sections of wedge-wire screen where water and undersized coal are removed; (2) air jets are directed on the coal at several points to remove surface moisture mechanically; (3) small unit heaters are so placed that the hot air blown on the coal will dry it as well as heat the building; (4) steam coils have been installed underneath the conveyor pans to evaporate the water which accumulates on them.

A PROPER sludge-recovery and water system is one of the most important items in the design of a wet-cleaning plant. To circulate water needed in the plant three 4,000-gallon and one 3,500-gallon DeLaval centrifugal pumps were installed. Two of the 4,000-gallon pumps are used for circulating dirty water; the 3,500-gallon pump is used to circulate the clear water from the Dorr thickener. The fourth pump was installed as a spare and is so connected that it can be used to pump either clear or dirty water.

The quantity of water actually in circulation at present is approximately 7,000 gallons per minute or 14 gallons per minute per ton of coal



Accurate Mixing Equipment at Champion No. 1

treated per hour, equivalent to about 2.5 tons of water per ton of coal.

On the hill behind the preparation plant is a steel tank of large size from which make-up water is obtained. This is fed into the plant through the spray nozzles on the sizing shakers. The concrete elevator boots for fine-cleaned coal, feed coal, refuse and the dirty-water storage tanks are built of concrete as an integral part of the first floor of the washery building. The water from the feed, cleaned coal and refuse elevator boots overflows into a launder leading to the dirty-water sump. The dirty-water pumps obtained their water from this sump and deliver it to a constant-head dirty-water tank located about 12 ft. above the Rhéolaveur cleaning launders.

Water not required by the dirty-water pumps overflows and is led to a concrete traction-type Dorr thickener 85 ft. in diamter. After clarification the overflow from the Dorr thickener is led to a clarified-water sump from which the clarified-water pump takes its suction, delivering the water to a clarified constant-head tank at an elevation of 12 ft. above the top level of the free-discharge plant. Water from the constant-head dirty-water tank is used in the sealed-discharge plant exclusively and water from the clarified constant-head tank is used in the free-discharge plant.

The concrete tankage, or boot, system is fitted with special designed sluicing valves. These discharge into a concrete drainage trench which in turn empties into a drainage sump. Here a vertical centrifugal pump is installed which at all times keeps the level of the drainage water below the level of an overflow waste pipe, pumping any excess water which might drain into the sump back into the system. Under normal conditions this prevents the loss of water, but, should it be desirable to remove some of the water from the plant, it can be discharged through the overflow of the drainage sump. The settling system also is arranged so that should it be impossible, due to blockage or other causes, to use the Dorr thickener, the dirty-water sump can be used as a settling basin.

The fine coal which settles from the water sent to the Dorr thickener is discharged by gravity into a small concrete sump. Thence it is pumped by a Morris open-impeller pump as a mixture of about 50 per cent solids to a steel cone near the top of the plant. From this cone it is fed into a Laughlin screen type continuous filter where most of the water is removed. The product has about 20 per cent of moisture. A scraper conveyor and feeder will deliver it to a Gordon-Davis pan-type heat drier having a capacity of approximately 15 tons per hour. In this unit the coal will be further dried to a moisture of not over 5 per cent and then will be discharged for mixing with the minus $\frac{3}{8}$-in. coal from the Carpenter driers or can be shipped separately as pulverized fuel. The heat drier has just been installed and operated mechanically, but as yet no coal has been fed to it.

Special air-driven retarders lower the cars down the six loading tracks at a speed which insures proper loading and minimum breakage. All sizes of coal above 1 in. are loaded by means of 48-in. flight conveyor loading booms which embody a new feature, a gate located 12 ft. back of the discharge point. This can be opened whenever a car has been loaded, thereby diverting the coal into the empty car following it. By this means the coal can be loaded continuously without spillage.

In addition to the six sizes previously mentioned the following mixtures have been loaded from this plant: Plus 4-in. lump, plus $2\frac{1}{2}$-in. lump, plus 1-in. lump, minus 4-in. coal, minus 1-in. slack, $\frac{3}{8}$x4-in. coal, and $\frac{3}{8}$x$2\frac{1}{2}$-in. coal. The plant also has loaded minus 6-in. coal, minus 4-in. coal and minus $2\frac{1}{2}$-in. slack with varying percentages of minus 1-in. or minus $\frac{3}{8}$-in. slack removed. The flexibility of the mixing and loading may be judged by the fact that in one day as many as 25 changes have been made in loading conditions.

Based on 700 tons per hour fed to the plant, the Champion plant operating power consumption is 790 kw.-hr. divided as follows: Dump (including cleaning-plant feed conveyors), 120 kw.-hr.; tipple, 60 kw.-hr.; cleaning plant, 120 kw.-hr.; pumping, 120 kw.-hr.; mixing, 120 kw.-hr.; drying and sludge recovery, 200 kw.-hr.; miscellaneous, 50 kw.-hr.

The operating power consumption, based on the above, therefore is 1.13 kw.-hr. per ton of coal fed to the plant, which is unusually low for a plant of this character.

Extreme measures have been adopted to abolish the dust nuisance and avoid spillage. The main shaking screens in the tipple have been completely housed with steel; on top of this housing exhauster fans have been installed to remove the dust.

The idea has always prevailed that coal-cleaning and preparation plants, by virtue of the material being handled, must be dirty and that dust cannot be kept out of the air. At the Champion plant special effort has been made to dispel this impression. The plant as constructed, is light and airy, over 50 per cent of its wall area being window space. Ample artificial illumination has been provided.

All the buildings composing this plant are warmed by unit heaters, which obtain steam from a 300-hp. Union Iron Works crossdrawn water-tube boiler set over a Harrington forced-draft chain-grate stoker. For fuel, minus $\frac{3}{8}$-in. middlings from the free-discharge washing plant containing about 35 per cent of ash are burned on a special design front-and-rear arch furnace. The steam from the boiler also furnishes heat to the fine-coal drier.

Employees' welfare has not been overlooked. Gears and belting have

been protected. The walkways are wide and are provided with hand railings and toe guards. Steel lockers, change rooms, a lunch room, hot and cold showers, lavatories and toilet facilities, all of which add to the material comfort of the workers, have been provided. These items have psychological effects which produce a higher efficiency and are consequently reflected in lower operating and maintenance costs.

The building which houses the loading and cleaning equipment is constructed of concrete and steel, reinforced concrete being used up to the second floor of the washery building. All hoppers, bins and boots are of reinforced concrete. The steel of the building is covered with Robertson asbestos-protected metal, to which aluminum paint has been applied. All sash are of steel; the roof consists of red concrete tile interspaced with skylight sections. All floors in the washery and tipple are of concrete.

Ample runways have been provided for the operation of the hand hoists used in making repairs on machinery. On the first floor of the building is a machine shop equipped with a punch, shears, drill press, pipe threaders, etc., making it possible to take care of normal repairs.

In speaking of performance it should be understood that this plant has been in continuous operation on minus 4-in. coal only since Jan. 1, 1929, and that with the inevitable necessity for adjustment and experimentation, in order to arrive finally at the best possible results, the purely technical figures obtained up to the present time should not be regarded as indicative of the final operating efficiency. Theoretically the plant is planned to operate on a 1.60-sp.gr. basis, but at Champion No. 1 it is necessary to remove from the prepared sizes some laminated material which, from a purely specific gravity viewpoint, should be left in the product but which, from a standpoint of visual inspection, should be removed and crushed and sent to the fine-coal plant for further cleaning.

When the larger sizes are mechanically prepared with efficient equipment not more than 2 or 3 per cent of float coal goes with the refuse and this is of specific gravity near that chosen as the line of separation. On the other hand when these sizes are cleaned by hand picking, the pickings themselves, as is well known, carry from 50 to 60 per cent of good coal, all of which goes to the waste pile.

The hand picking of 2½ x 4-in. coal has been considered fairly efficient from the standpoint of the quality of the shipped product even though it is conceded that such hand methods can accomplish little on minus 2-in. coal. Actual tests, however, on handpicked products at this size have shown that the quantity of impurities in the prepared product will range from 0.4 to 4.5 per cent. In other words, one cannot depend on hand-picking to produce a uniform product, for the exactitude with which it is performed is so largely dependent upon the character of coal and the human element.

The heavy-gravity material left in the 2½ x 4-in. size after mechanical preparation contains only 33 per cent ash. Actual tests on 2½ x 4-in. coal by hand-picking methods showed the material left in the market product contained approximately 45 per cent ash. When the smaller sizes—say, 1x2½-in.—are hand-picked the percentage of impurities left in the clean coal ranges by actual test from 1 up to 5 per cent, indicating a marked lack of uniformity in the quality of the product. The material left in this size averaged about 50 per cent ash, which is on the border line of rock or slaty material.

As the Champion No. 1 plant draws its raw coal from five mines, the feed is naturally of varying quality. The ash content in the incoming 4 x 0-in. raw coal fluctuates from 10 to 12 per cent, in the 1 x 0-in. from 12 to 15 per cent and in the ⅜ x 0-in. from 12 to 16 per cent.

Based on the sink-and-float methods used for maintaining plant control, the following table shows the character of the work done by the Champion No. 1 plant:

Size	Per Cent of Sink in Cleaned Coal @ 1.60 Sp.Gr.	Per Cent of Ash in Sink
4 x 2½	1.00	33.0
2½ x 1	1.00	35.0
1 x ⅜	2.00	40.0
⅜ x 0	2.60	30.0
4 x 0	1.50	34.6

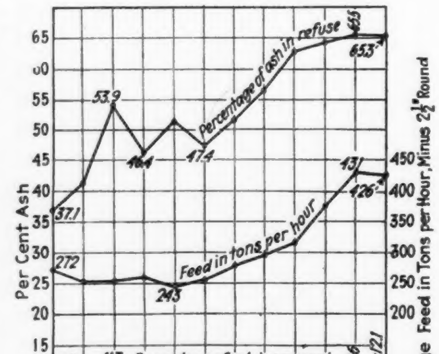
The ash in the general refuse from the plant is approximately 66 per cent.

The analysis of the sink in the washed coal indicates that little or no rock or slate is left in the washed coal. Only material of intermediate gravity is found in the market product, which is as it should be in an efficient cleaning plant. The average loss of coal in this refuse, expressed in terms of feed, is 0.3 per cent.

Increasing Capacity and Efficiency At Library

CHAMPION No. 3 preparation plant of the Pittsburgh Coal Co. is located at Library, Pa., and cleans the output of Montour No. 10 mine. This is a dry preparation plant, using Arms tables and built by Roberts & Schaefer in 1926. The plant was placed in operation in February, 1927. As this plant already has been described in *Coal Age,* no general description need be given except to outline what has been done to increase its capacity and efficiency.

How Judgment and Experiment Have Improved Output and Quality at Library Plant



The plant was designed for 325 tons per hour, of which minus $\frac{1}{16}$-in. coal was to be bypassed, leaving 300 tons per hour actually to be treated. The following sizes were screened before separation: 2½ in. x 1½ in. square, 1½ in. x 1 in., 1 in. x ⅝ in., ⅝ in. x $\frac{7}{16}$ in., $\frac{7}{16}$ in. x $\frac{5}{16}$ in., $\frac{3}{16}$ in. x $\frac{1}{16}$ in. and minus $\frac{1}{16}$ in.

Screening below $\frac{5}{16}$ in. was not found practicable because of the blinding of screen cloths and the resultant variation in table loads and cleaning results. The present sizes treated are: 1¾ in. x 2½ in., 1⅛ in. x 1¾ in., $\frac{13}{16}$ in. x 1⅛ in., ⅝ in. x $\frac{13}{16}$ in., $\frac{5}{16}$ in. x ⅝ in. and minus $\frac{5}{16}$ in.

Such close sizing seems unnecessary, and with deeper beds larger size ranges are possible. It is expected that ultimately the coal will be screened to only three sizes: 1⅛ in. x 2½ in., $\frac{5}{16}$ in. x 1⅛ in. and minus $\frac{5}{16}$ in.

By speeding up the process of stratification on the Arms concen-

trators higher capacities have been obtained. This has been done by the introduction of higher riffles, stronger air pressures, deeper beds and deflecting plates which carry the clean coal strata across the bed, away from the refuse line.

Constant sampling and quick analysis have been of marked assistance in increasing the efficiency of separation. Results of the previous day's run are now furnished to the plant at 7:30 in the morning.

The accompanying chart shows how the capacity was increased and the product improved during 1928. A. E. Burgesser, plant superintendent from February to August, and R. A. MacLachlan, superintendent from September until the present time, are entitled to credit for these improvements.

Meeting Gas and Metallurgical Coal Demands

CHAMPION No. 4, or Warden, preparation plant of the Pittsburgh Coal Co. uses the Rhéolaevur process. It is quite similar to the Champion No. 1 plant, much the same machinery being used but with a different grouping.

The fundamental purposes in its design were the production of the highest possible quality of coal for metallurgical and gas purposes and the ability to ship the coal thus cleaned, sized or unsized, as market demands might warrant. Not only was it desirable to reduce ash and sulphur to a minimum consistent with the inherent characteristics of the seam but also to remove so far as possible non-coking material, which has an adverse effect on the coke structure and also impurities that lower the melting point of the ash.

F. S. Sinnatt, in a paper published by the Society of Chemical Industry, states that the percentage of fusain present in coal is not less than 2 or 3 per cent and may probably be as high as from 5 to 8 per cent in certain layers. He also gives the following variations for the caking index in certain seams:

Seam	Coal	Vitrain	Clarain	Durain	Fusain
A.....	15	9	17	6	nil.
W.....	4	3	7	5	nil.

He says that the fine dust taken from a cyclone collector contained 49 per cent fusain and also that the settlings from the circulating water in a wet cleaning plant may contain as much as 52 per cent fusain.

An ultimate analysis of the fusain from the Pittsburgh seam shows the following percentages: Carbon, 81.14; hydrogen, 2.69; nitrogen, 0.29; oxygen, 6.24; sulphur, 0.33, and ash, 9.31. The analysis of ash on the same sample was: Silica, 7; iron oxide, 13.05; aluminum, 4.96; and lime, 60.

From the extremely high lime content of the ash, it would naturally be inferred that the fusing point of this material would be extremely low. Actual tests have shown this temperature to be from 2,050 to 2,200 deg. F. The effect of this low-fusing ash material on the rest of the coal is suggested by the fact that plus $\frac{3}{4}$ in. lump has a fusion point of 2,750 deg. F. and that minus $\frac{3}{4}$ in. slack before cleaning has a fusion point of 2,360 deg. F.

Unquestionably the presence of fusain largely explains why the slack fuses at a lower temperature than the lump. The low fusing point of the extraneous impurities also is an important factor in this particular case. The figures indicate that to produce a metallurgical coal of the highest possible quality this non-coking material should be removed.

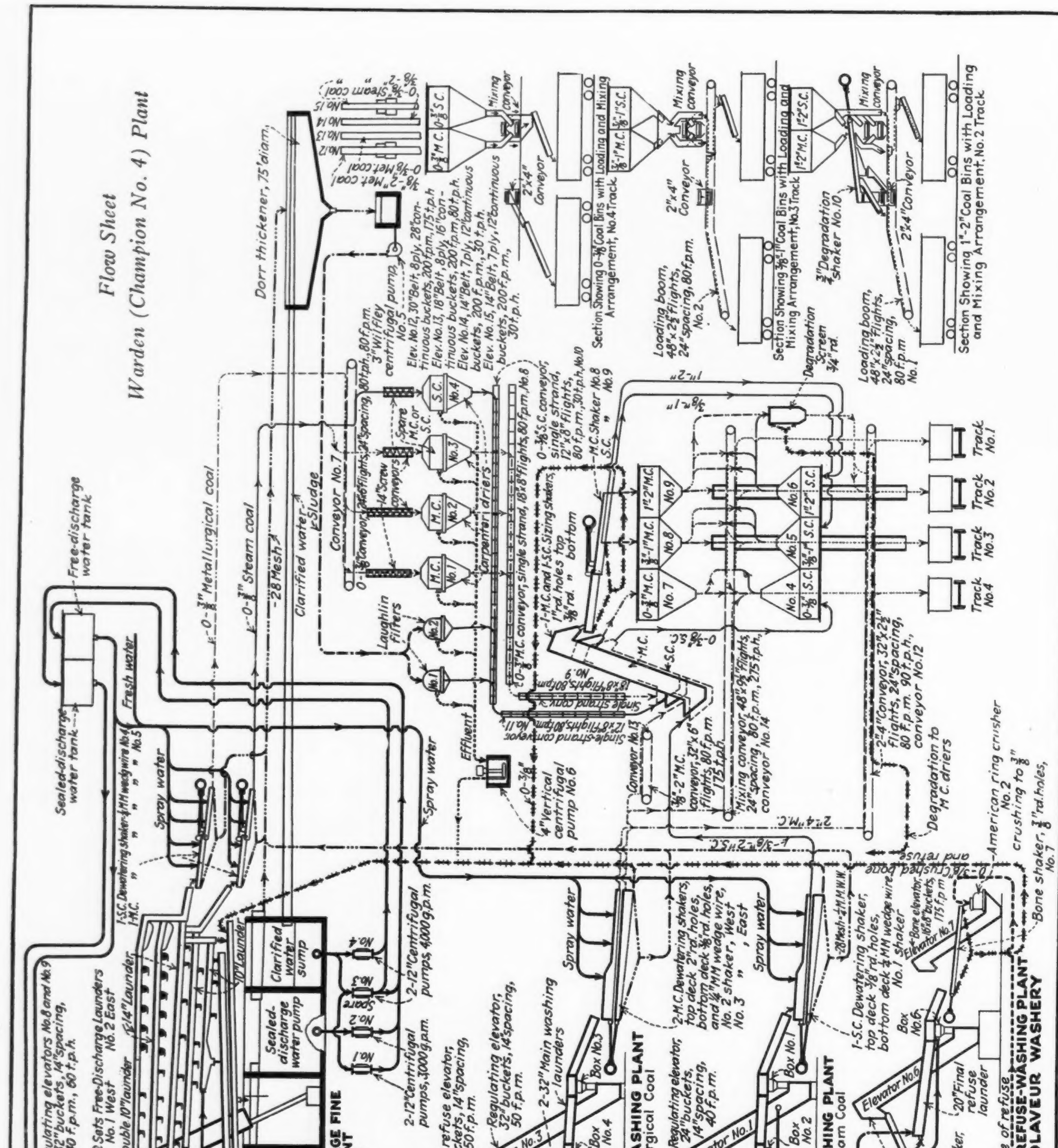
THE plus 4-in. lump at Ocean is hand-picked and shipped direct and the minus 4-in. coal goes to a 1,250-ton storage bin and then by aerial tram to Warden. The plus 4-in. lump at Warden also is loaded direct, the minus 4-in. coal going directly from the shaker, by a 54-in. belt conveyor, to the storage bins, where it is mixed with the Ocean coal.

Warden Mine Just Before Completion With Its Large Silo-Like Storage Bins

In order to obtain such accurate mixing as is essential to the shipping of constant-quality products three concrete storage bins were built. These are 45 ft. in diameter and 52 ft. 6 in. high, each with a capacity of 1,000 tons. In building these bins clearance had to be allowed for a standard railroad car to pass through the structure at one side without interfering with the belt conveyor which takes the coal to the cleaning plant. Conical-bottom bins were designed and erected by the MacDonald Spencer Engineering Co. The coal is fed from the bottom of the bins by three reciprocating feeders and then conveyed to the cleaning plant proper after the tramp iron has been removed by a magnet.

Champion No. 4 plant is a combination low-gravity and high-gravity cleaning plant. To insure highest quality in the finished output the first treatment is at a low gravity. The raw material naturally is of good analysis so that a high percentage of the feed to the plant is obtained by this treatment. Coal below 1.40 to 1.45 sp.gr. thus represents the greater part of the output, and this product is separately conducted through the process following the main launder separation.

Material heavier than 1.40 to 1.45 sp.gr. is separately treated and separation made at the normal gravity of 1.60 for segregation of final refuse. To accomplish this the arrangements and plant layout have been varied considerably from those at Champion No. 1. For instance, the Champion No. 1 primary launders are 48-in. wide with straight sides, whereas the Champion No. 4 launders are 48 in. at the top and taper to 32 in. at the bottom. In order to make as large a separation as possible of the low-gravity coal, Champion No. 4 has a three-box primary launder instead of


Flow Sheet
Warden (Champion No. 4) Plant
FREE-DISCHARGE FINE COAL PLANT
0-3/8" Feed
MAIN WASHING PLANT
Metallurgical Coal
REWASHING PLANT
Steam Coal
FINAL REFUSE-WASHING PLANT
RHEOLAVEUR WASHERY

the two-box launder installed at Champion No. 1.

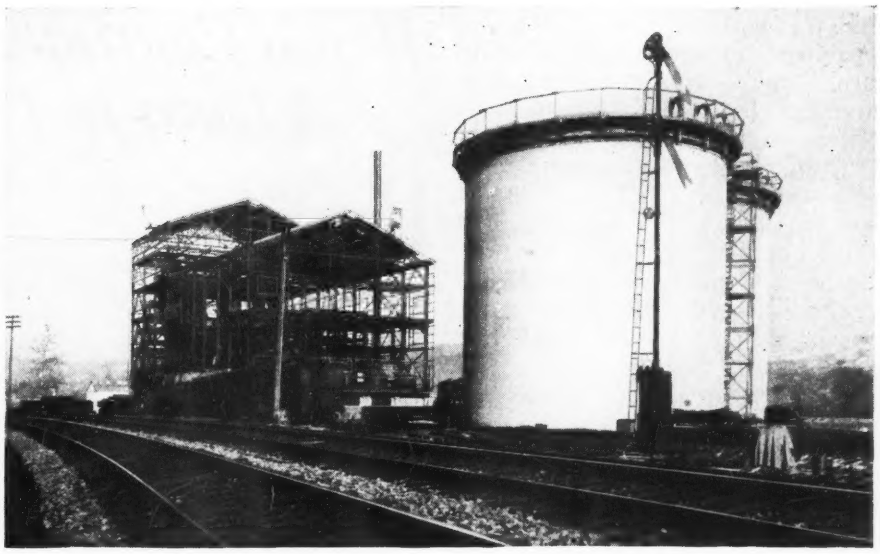
It should be added that the cleaned product at 1.60 gravity is superior to anything heretofore produced in this field. What is accomplished is the conversion of the greater part of the coal treated into a super-coal and the additional gain of the remaining portion as a cleaned product highly suitable for other uses where extremely low ash and sulphur analyses are not required.

The sequence of operations at Champion No. 4 for handling the 1.40 to 1.60 gravity material is practically a duplicate of that at Champion No. 1, except that the feed from the low-gravity operation is crushed to minus 2 in. before treatment. Because of this cleaning at a low specific gravity the capacity per unit is less than when cleaning at a high gravity, hence the Champion No. 4 cleaning plant, rated at 300 tons per hour, has approximately the same cubical contents as the 500-ton Champion No. 1 plant.

The fine-coal cleaning plant at Champion No. 4 also differs in some points from that at Champion No. 1 and again the question of reduction in capacity for low-gravity cleaning comes into play. The plant is five launders high instead of four as at Champion No. 1 and the Champion No. 4 top launder is a double 10-in. launder for approximately half its length. These differences were made to reduce the speed of the flow and consequently to effect a more accurate classification. The first two launders are used for the low-gravity product exclusively and the third launder can be diverted for either high- or low-gravity cleaning, leaving the fourth and fifth launders to be used normally for recirculation.

It is in the handling of the clean coal from the discharge of the fine-coal plant that the most marked difference between the Champion No. 4 and the Champion No. 1 plants is found, for in this case no elevators are used.

The minus $\frac{3}{8}$-in. cleaned coal is delivered to high-speed dewatering shakers with $\frac{1}{4}$-mm. wedge-wire decks. The screens are liberally sprayed to wash out the minus $\frac{1}{4}$-mm. material, which is collected in a Dorr thickener. The thickened material, or sludge, is pumped to two Laughlin filters. The filtered material joins the minus $\frac{3}{8}$-in. coal from the Carpenter driers which handle the higher gravity product.



Champion No. 5, or Banning, in the Making; Prepares Gas and Metallurgical Coal

The oversize from these dewatering screens is conveyed to four Carpenter driers, two for the low-gravity coal, one for that of higher-gravity coal and one which is a spare and may be used for either grade of coal in case of necessity. From the driers each coal is conveyed to separate elevators which discharge into steel storage bins.

The clean coal from the ends of the two primary launders is dewatered and sized over a two-deck flexible-hanger shaking screen which has 2-in. perforations on the top deck and $\frac{3}{8}$-in. on the lower. The 2x4-in. coal is either loaded direct on a separate conveyor carrying it to the loading tracks or diverted to a mixing conveyor when loading mixed products. The $\frac{3}{8}$x2-in. coal can either be diverted to this same mixing conveyor or elevated to the rescreen on top of the loading bins.

The clean coal from the end of the high-gravity launder is screened over a single-deck shaking screen with $\frac{3}{8}$-in. perforations, and is either diverted to the mixing conveyor or elevated to another rescreen on top of the loading bins. All the minus $\frac{3}{8}$-in. material goes to the feed elevator boots of the free-discharge plant.

The fundamental object in the design of the mixing and loading system was to make it possible to load separately any of the sizes of either gravity coal on any of the four loading tracks. It also was arranged so that any specified combination either of high- and low-gravity coal or of sizes could be mixed. Six bins each of 75 tons capacity are provided and are located over the three loading tracks in duplicate parallel units of three bins each. One unit of three bins is for low-gravity coal in sizes minus $\frac{3}{8}$ in., $\frac{3}{8}$x1 in. and 1x2 in. and the other unit is for the high-gravity product in the same sizes.

Belt elevators deliver minus $\frac{3}{8}$-in. coal into the respective bins, and belt elevators also deliver all $\frac{3}{8}$x2-in. coal to the top of the bins. The discharge of these elevators is onto shaking screens which divide the $\frac{3}{8}$x2-in. into $\frac{3}{8}$x1-in. and 1x2-in. before delivery into the respective bins. Besides the six sized products thus obtained there is a seventh product available for loading: namely, 2x4-in. low-gravity coal.

In order to be able to load any of these products separately or in any desired combination, a 48-in. flight conveyor is located under the bins to receive the contents of any one bin or group of bins. This same conveyor also can be used to gather directly any of the products from the end of the sizing shakers in the cleaning plant. When doing this the minus $\frac{3}{8}$-in. coal goes direct to the bins and is subsequently mixed back.

Any product or combination can be loaded on either the top or bottom run of this conveyor. It passes over the four loading tracks, two of which are equipped with booms. By means of adjustable gates the conveyor can discharge all or any part of its load at any point.

As already mentioned, there also is a separate conveyor for the 2x4-in. coal. This unit is parallel with the mixing conveyor and passes over all four tracks and both loading booms.

Spiral chutes are used to lower the plus $\frac{3}{8}$-in. sizes in the loading bins. A shaking degradation screen also is provided to rescreen the coal

from the two 1x2-in. bins when loaded separately. The degradation is returned to the driers by the bottom strand of the 2x4-in. conveyor.

Between the Champion No. 4 structure and that of Champion No. 1 some fundamental difference in design may be found. Champion No. 4 is like a metallurgical mill: the structure is more nearly a housing than a support for the machinery. This permits a design with less steel per cubic foot of building.

By using dewatering screens in place of elevators for the fine coal it has been possible to place the driers and filters on the first floor, a more advantageous location. Subway grating is used in place of concrete on the transmission floors.

IT HAS been mentioned that the object of this plant was to produce the highest possible quality of metallurgical coal. The following tabulation will show the results obtained for the first weeks in February:

Size	Per Cent of Sink in Cleaned Coal @ 1.60 Sp.Gr.	Per Cent of Ash in Cleaned Coal
4 x 2 in.	0.5	4.8
2 x ⅜ in.	0.9	5.2
⅜ x 8 mesh	0.6	4.4
	Per Cent of Float in Refuse @ 1.60 Sp.Gr.	Per Cent of Ash in Refuse
4 x ⅜ in.	2.2	67.6
⅜ in. x 48 mesh	1.8	66.0

It may be interesting also to show what has been accomplished in removing fusain and its effect on the resultant product:

	Character of Ash	
	Fusion Point, Deg. F.	Per Cent CaO
Raw coal, 0-⅜ in.	2,350	10.0
Metallurgical coal, ⅜ in. x 48 mesh	2,650	4.9
Dorr thickener underflow, —48 mesh	2,150	25.4
Fusain	2,050-2,200	45 to 60

The Champion No. 5, or Banning, plant cleans the coal from the Banning Nos. 1 and 2 mines. The design of the cleaning plant proper is practically a duplicate of that at Champion No. 4.

The same grades of coal are prepared, but the loading facilities differ in that there are only two sizes made of each grade, and the coal is loaded direct into cars rather than by means of bins. The metallurgical coal sizes made are ⅜x4 in. and minus ⅜ in., and the commercial sizes are ⅜x2 in. and minus ⅜ in. The various sizes of the two grades of coal are conveyed across the main-line tracks of the Pittsburgh & Lake Erie R.R. to the existing tipple tracks, where they may also be used to load the two grades of coal.

What Continuous Plant Control Means in Coal Cleaning

PLANT control is of primary importance in any preparation plant if maximum efficiency and uniformity of product is to be obtained. At the Champion plants such control is provided:

(1) By a complete and accurate method of sampling the various products. On each of the clean-coal flight conveyors is an automatic sampling gate through which the sample drops into a 10-ton bin, from which the samples are conveyed to a Sturtevant gyratory crusher, especially designed for rugged work. This unit crushes the coal down to ¼ in. and cuts out automatically about 10 per cent, which is quartered down still further until the required quantity is obtained. The rejected part of the sample returns to the feed coal.

(2) By sink-and-float tests on the various products of the cleaning plant and complete chemical analysis of the various market products. It is essential that the men operating the cleaning plants be able at all times quickly to ascertain the character of the various products. To this end a place has been set aside on the main floor of the preparation plant where sink-and-float tests can be made quickly and frequently. All the necessary equipment and facilities for performing this work are provided.

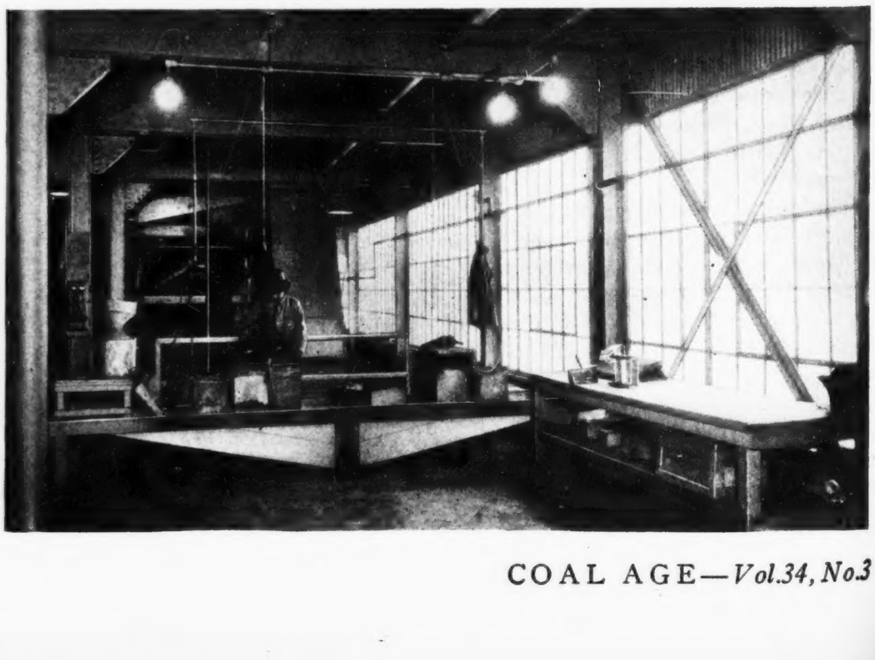
A separate building contains the plant laboratory where the daily routine tests are made. A central laboratory is maintained at Library, Pa. This is fully equipped for all classes of coal and complete ash analyses. In the central laboratory the control samples from the various plant laboratories are carefully checked from a composite sample sent at regular intervals.

(3) By rigid visual inspection of the coal as shipped. On account of loading out so many sizes and mixtures of clean coal and in order to facilitate the billing and shipping of the cars, a special office has been built over the loading tracks at the discharge end of the loading booms to afford an unobstructed view of all the cars as they are loaded and pass by. The post of the shipping clerk is in this office and he checks the loading and takes the car numbers. This office has easy access to the general office and to the loading and mixing floor.

Not only is the coal inspected by the shipping clerk but the loading foreman checks its quality and an inspector of the sales department is kept at the plant to see that the coal is of the proper quality and that the mixing is as specified by the customer. In short, everything possible is done to insure a shipped product of uniform quality and size.

The writer desires to acknowledge assistance given in the preparation of this and preceding articles on the Pittsburgh plants by C. E. Lesher, I. G. Lovering and R. A. MacLachlan, of the Pittsburgh Coal Co.; G. V. Woody and J. R. Campbell, of the Koppers-Rhéolaveur Corporation, and Andrews Allen and H. F. Hebley, of Allen & Garcia Co. The flow sheets were made by Mr. Lovering.

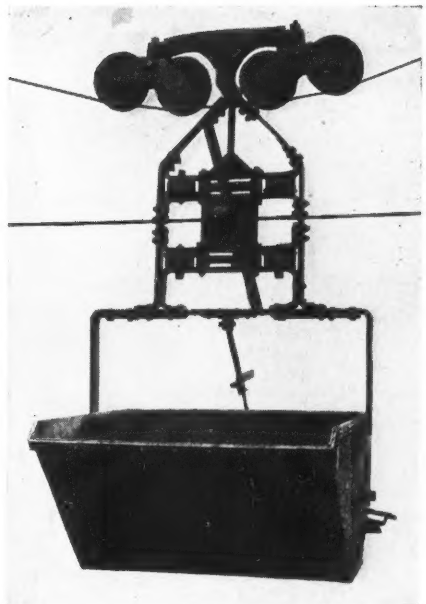
Where the Quality of Coal Is Tested Before Shipment



Aerial Tramways

Solve Transportation Difficulties In Central Cleaning Plant Layout

By F. C. Carstarphen
Consulting Engineer
Denver, Colo.



Bucket Negotiates Angle Station When Clamped to Traction Rope

EARLY in 1928 the Pittsburgh Coal Co. decided to clean mechanically the coal from its four mines on the Youghiogheny River. The Champion plant was then being completed in the western part of the field, where it was possible to bring together in railroad cars the output of five mines for centralized treatment. A central plant taking coal from these four mines was not feasible; so to avoid the cost of four plants it was decided to build two and bring coal from two mines to each.

The locations chosen for these plants were Banning No. 1 mine and Warden mine, and the problem then was to select a method of transporting coal from Banning No 2 to Banning No. 1, and from Ocean to Warden. Each of these four mines were equipped with shaking screens and picking tables; therefore only the minus 4-in. coal was to be transported. High cost prohibited connecting these mines in pairs underground. The topography, which made outside haulage unattractive and expensive, was no bar to aerial tramming. A further powerful argument in favor of the aerial tramway was the opportunity it affords for disposing of washery refuse on the back haul. Accordingly the company adopted this system, its own organization making the design and directing the construction.

At Banning No. 2 and at Ocean 4-in. coal is conveyed direct from the screens to 1,500-ton bunker type bins. This storage is sufficient to even out the irregularity of mine and tipple operation and insure a steady flow of coal over the aerial tramway; also to permit night-shift operation of the cleaning plant and tramway. In each case the initial capacity of these units is rated at one-half the daily output of the two mines served. The capacity of each tramway is 125 tons of coal per hour.

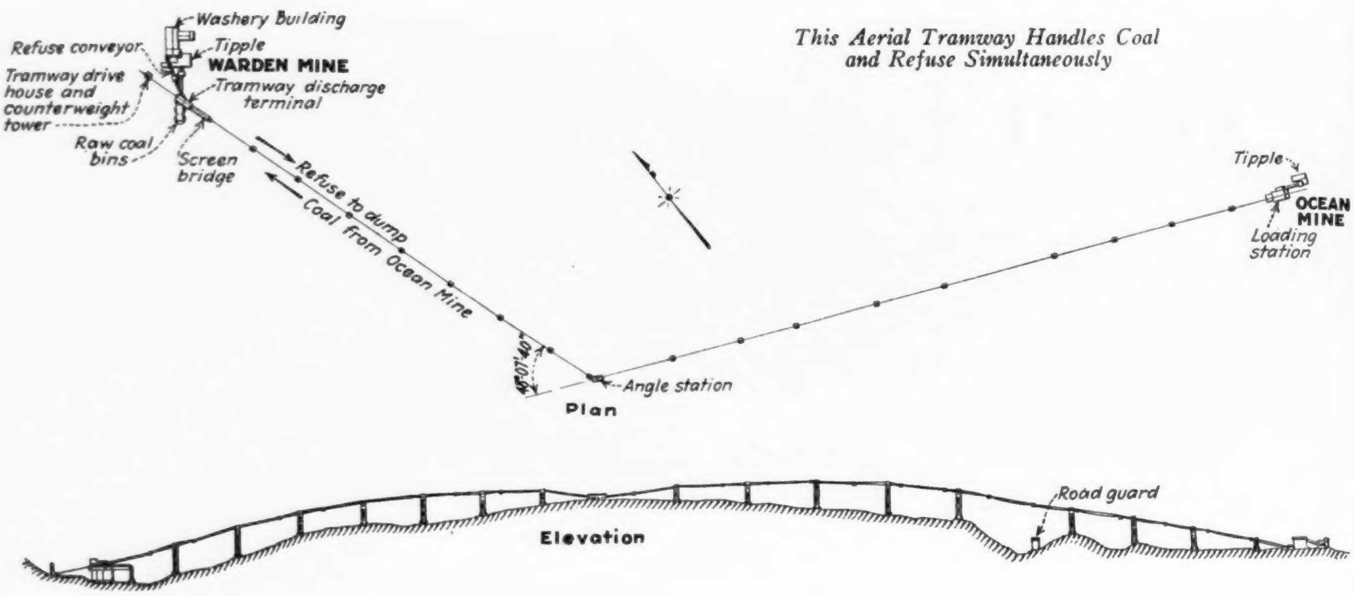
The Ocean-Warden aerial tramway is about 6,100 ft. long, rises to a summit 400 ft. higher than the loading terminal and empties into a hopper set 80 ft. above the ground. The quantity of washery waste to be handled by the line is estimated at 18 tons per hour. Scrutiny of the area along the right of way led to the decision to make average height of these towers 107 ft. and the loftiest 160 ft. All towers are of steel and are so designed that the ratio of weight to volume is 1 lb. per cubic foot. The profile of the line is such that the track cables exert an equal pressure on all saddles, a factor which simplified the design and construction of the towers and will result in subsequent economies. This design has also eliminated all critical points of cable support. These would add to the difficulties of maintenance.

A CONVEYOR from the tipple serves the bunker at the loading terminal, to which coal is lowered in spiral chutes. Tramway carriers are loaded by five motor-driven reciprocating plate feeders activated by push buttons. When loaded, the carriers coast to attachers where the grips are closed upon a $\frac{3}{4}$-in. plow-steel traction rope of lang lay construction, and move along $1\frac{3}{4}$-in. lock coil track cables at a speed of 500 ft. per minute.

There is a tradition that aerial tramways should be built in "bee lines." As straight lines connecting these mines fall for the most part in the river channel, it was necessary to include a large angle in the alignment of each tramway. In the line between Ocean and Warden the angle is 48 deg. and that between the Bannings 53 deg. In common practice angles of this magnitude usually are handled by a station equipped with attachers and detachers, the carriers in both directions being freed from the traction rope and allowed to coast along a curved rail. As the operation of such stations cannot be made reliably automatic, labor cost of attendance is a big item and should be eliminated.

Carriers have been equipped with four flanged wheels aligned vertically as shown in the accompanying photograph. They are Timken-mounted and engage suitable T-rail guides. The assembly traverses the curve at full speed—supported, on a four-wheel truck which moves, as it were, circumferentially over the surface of a vertical cylinder. This method marks a new departure in the design of angle stations, disproving the previously held outside contention that "it can't be done."

IN THE Ocean-Warden tramway the discharge terminal could not be accommodated entirely on the top of the storage hopper. A bridge was erected over an adjacent highway and the tipple tracks, and supports the overhang of the discharge terminal, its



This Aerial Tramway Handles Coal and Refuse Simultaneously

deck being 80 ft. above the highway.

This elevation of the discharge terminal is not ideal for cable anchorages or machinery, so the anchor block of the former and the foundations of the latter were combined to form the support of the traction-rope tension tower.

The driving motor is a 75-hp. slipring type, direct connected to a herringbone speed reducer which in turn drives a 6-ft. diameter grip sheave. Control is remote through push buttons, magnetic switches, automatic starters and resistance grids, permitting continuous operation at full speed ahead and 50 per cent of full speed either ahead or in reverse. All the important guide sheaves are 6 ft. in diameter, insuring long life to the traction rope. Timken bearings are used throughout. The brake is a combination manual and motor-driven band type.

THE Banning tramway, 6,650 ft. long, has a combined capacity in coal and waste equal to that of the Warden tramway but the volume of refuse to be handled is less. Consequently the towers average only 72 ft. in height. This line twice crosses the river and the right of way of the Baltimore & Ohio R.R.

The carriages have four wheels, hanger pins are made of hydraulic steel tubing and hangers are steel castings together with fabricated steel flats. These hangers support cast semi-steel trunnion boxes which accommodate the body of the grips, which are 8 in. in diameter. All grips are designed to close downward or upward but in this case are used in the downward position. The open jaw of the grip moves downward to seize the traction rope at the attacher with a force that offers a resistance to slipping of 1,800 lb. when the back lever is closed with a pressure of 60 lb. Buckets are of the self-dumping and self-righting type, have a volume of 36 cu.ft. and hold more than a ton of coal.

Why the Pittsburgh Coal Co. Called for a New Deal

(Continued from page 139)

form as to quality. That is to say, the coal from a number of mines has been standardized. Furthermore, the physical layout at Champion favors prompt and regular shipments.

These same general considerations governed the layout and design of the preparation plants at Warden and Banning, where the Rhéo system also is employed. Here the coal to be treated is gas and coking coal and the cleaning is controlled by sulphur as well as ash analysis. The plants are so designed that the analysis of the coal shipped may be controlled at will between the highest quality and the average. The customer of the Pittsburgh Coal Co. may have what he buys.

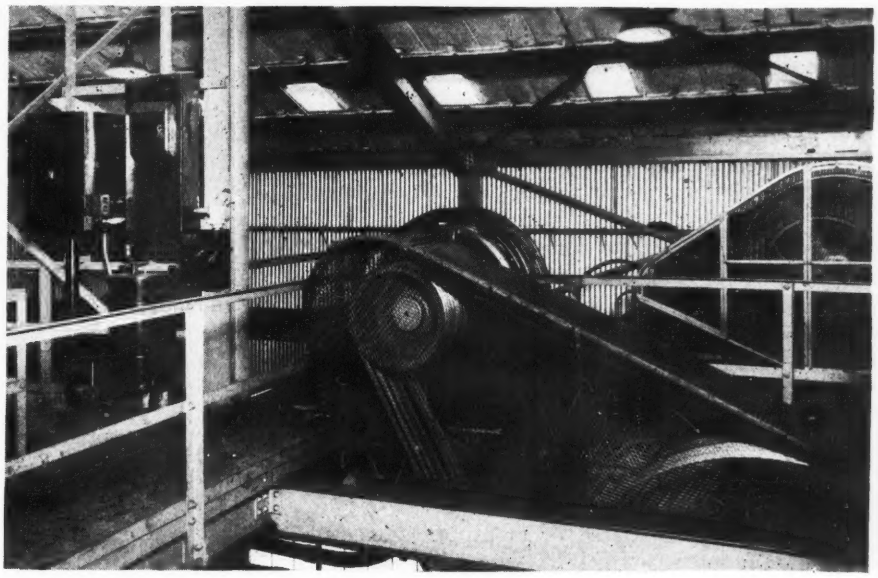
The central-plant idea could not be carried so far with the four mines selected on the Yough River division of the Pittsburgh & Lake Erie. The topography on the west bank of the Youghiogheny River presents many serious obstacles to any sizable plant layout. A compromise was reached with the ideal of one central plant by building two plants as nearly duplicates as possible, each to serve two mines. Each of the four mines has a new tipple and screening plant, and these are fully utilized under the arrangement selected. Bin storage for 3,000 tons, sufficient for a 10-hour run, is the meeting point for the coal from each pair of mines.

Coal from the Warden mine is carried to this large storage by belt conveyor; that from the Ocean mine, a mile away, is brought to the same bin by aerial tramway. The bins permit mixing as well as effectually divorcing plant operation from mine operation. In the same way coal passing through 4-in. round holes at Banning No. 1, a distance of approximately a mile, by aerial tramway, and the coal from Banning No. 1 tipple is put in the same bins by belt conveyors.

The Champion plant was authorized by the board of directors Oct. 26, 1927, and the first surveyor's stake was driven on Nov. 5. The first coal was dumped and the first cleaned coal loaded Sept. 23, 1928. Some idea of the magnitude of the work accomplished in this short period of 11 months will be had from the descriptions and pictures on succeeding pages of this issue of *Coal Age*. Field construction on the Warden plant was begun May 10, 1928, and the first cleaned coal produced Jan. 6, 1929. Ground was broken at Banning on Aug. 23, 1928, and construction is proceeding according to schedule.

Fitting Electrical Equipment

Main Drive, Champion Plant



To the New Job at Pittsburgh Cleaning Plants

By E. J. Gealy

Assistant General Superintendent of Mechanical Equipment Pittsburgh Coal Co.

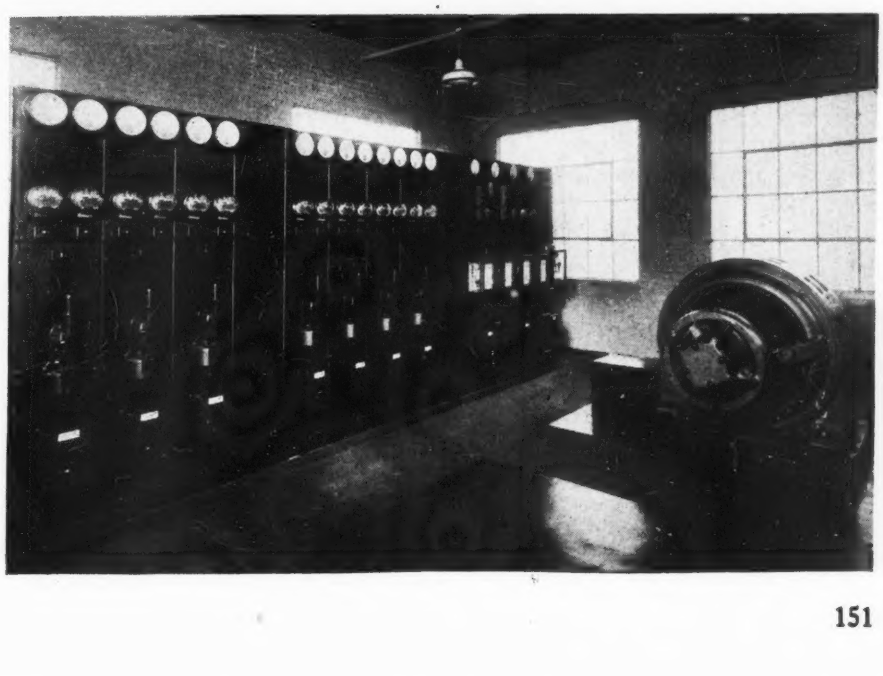
EARLY plans for the Champion, Warden, Banning and Montour preparation plants of the Pittsburgh Coal Co. indicated that the selection of the electrical and mechanical equipment would be important in assuring low cost of operation and the economic success of the program. It also was clear that inasmuch as the plants would represent one of the greatest forward strides ever made in bituminous coal preparation, the choice of the equipment was not a matter of slavishly following common practice, but of choosing each piece of machinery for the specific job it was to do.

The problem was twofold: (1) The selection of equipment to duplicate as far as possible present stocks now held by the company, and (2) the determination of suitable types to harmonize with the new features of the plants. This necessitated consideration of equipment used in other modern bituminous plants as well as apparatus heretofore employed only in anthracite preparation, ore concentration or preparation plants abroad.

When it is considered that the new plants are built to operate under loads and conditions seldom encountered in bituminous mining and to accomplish unusual results, the reasons for such careful choice of equipment become apparent. The product of the Champion plant, for example, is both mechanically and magnetically cleaned. For accomplishing the latter the Electric Controller & Manufacturing Co. supplied one of the largest electromagnets ever made for industrial purposes. Day and night operation is a feature which exerted a strong influence on type and arrangement of the machinery and presented a real lighting problem.

Ample justification has been found for approaching the problem of equipping the plants with due regard to economical operation and future influence upon bituminous coal-cleaning methods. By deviating slightly from the usual practices in selecting the types of over 450 motors required for the four plants there was a saving of approximately $50,000 in first cost. An additional $5,000 saving resulted from selecting motors of standard speed ratings.

The absence of dust and the installation of Allis-Chalmers "Texrope" and Dayton Rubber Co. "Cogbelt" drives permitted the use of standard type motor and control equipment. These drives also elim-



Metering and Control Panels and Synchronous Condenser, Champion Substation

inate the shocks and strains characteristic of direct couplings. Standard type motors, by reason of their greater efficiency, better power factor and decreased investment in spare parts also have resulted in lower power costs. Every effort was made when designing the plants to use motors of a selected scale of speeds, and by this arrangement and the almost entire use of General Electric motors the maximum amount of duplication and interchangeability is attained and the number of spare units kept to a minimum.

Power-factor correction also was an important item and the investment made for this purpose has resulted, under present load conditions in saving approximately $750 per month at the Champion plant. It is expected that the total investment in power-factor corrective equipment will be returned in less than ten months. Safe operation is attained by limiting the voltage to 440 and no oil switches or oil-immersed equipment is installed in any of the newest plants. Automatic push-button control is used almost entirely and protects the workmen by eliminating the necessity for exposure to arcs or manually operated control equipment. The usual protective electrically and mechanically interlocking practices also have been installed.

Many features to insure continuous electric service are provided. The power supply at each plant comes in over a two-way feed system. Transformer capacity has been provided to permit successful operation in open delta should one of the three main transformers be incapacitated. The power circuits are split up to localize any unusual disturbance and when such a condition arises the circuits can readily be rearranged through spare feeders and oil circuit breakers to permit quick restoration of service.

At the Champion plant a common motor- and turbine-driven direct-current generator is provided. Under normal conditions the motor is driven by purchased power and the direct-current generator supplies energy for a Dorr thickener, a magnetic separator, a boiler fan and a few lights. As the direct-current equipment must function continuously to avoid operating difficulties, the turbine is arranged to automatically take up the work of driving the direct-current generator if purchased power fails.

Purchased power is used at all of the cleaning plants. At Champion energy is supplied from a two-way 25,000-volt system through three 500-kva. transformers, which step down the voltage to 440, at which it is metered and purchased. Two parallel circuits, to provide as near continuous service as is possible, carry the energy from the transformer busbar rack into the main substation.

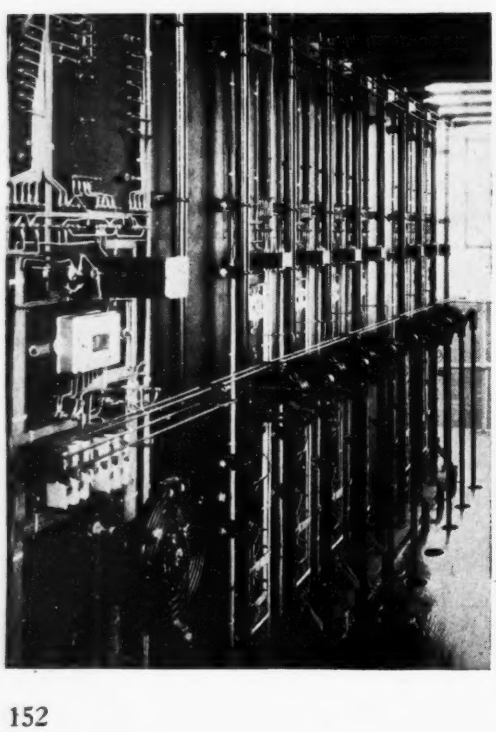
As the Champion substation was located on a hillside away from the direction of dust travel, it was necessary to build a high foundation wall regardless of the shape or size of the building. To make use of this wall the substation was made with a cellar and a main upper floor. The elevation of the transformer busbar structure is such that the main incoming power leads enter near the ceiling of the cellar. This feature made it possible to place all arcing and possibly dangerous equipment in the basement where it is isolated and protected.

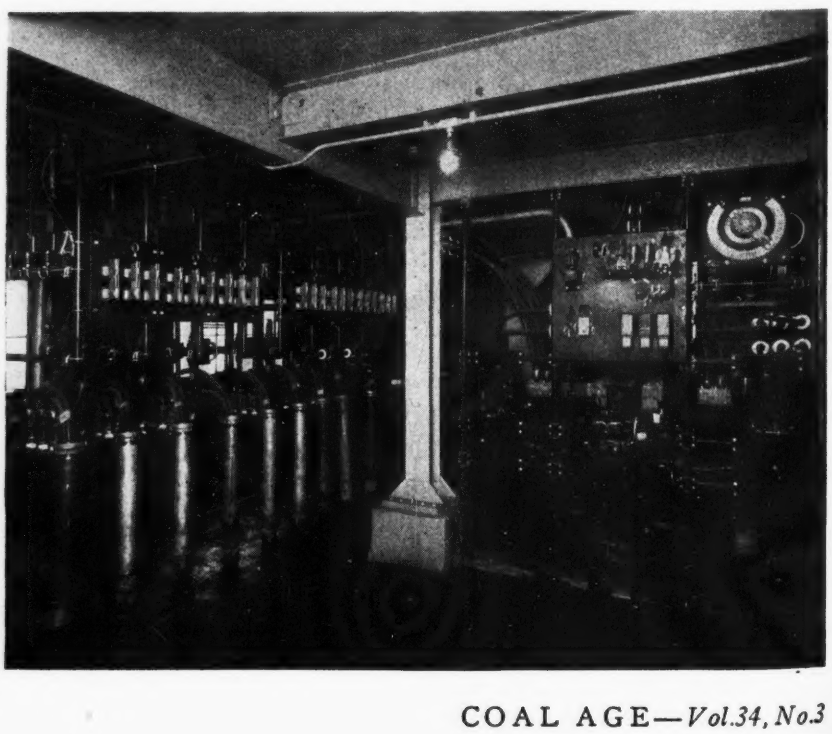
The metering and control apparatus is placed on the upper floor and, as a result, the switchboard panels, which are similar at all the plants, together with their protective circuits and meters, are located on the upper floor. Tests, readings, charts and nearly all inspections, therefore, can be made without danger of shock or injury from any but the meter and relay circuits, which carry 110 volts.

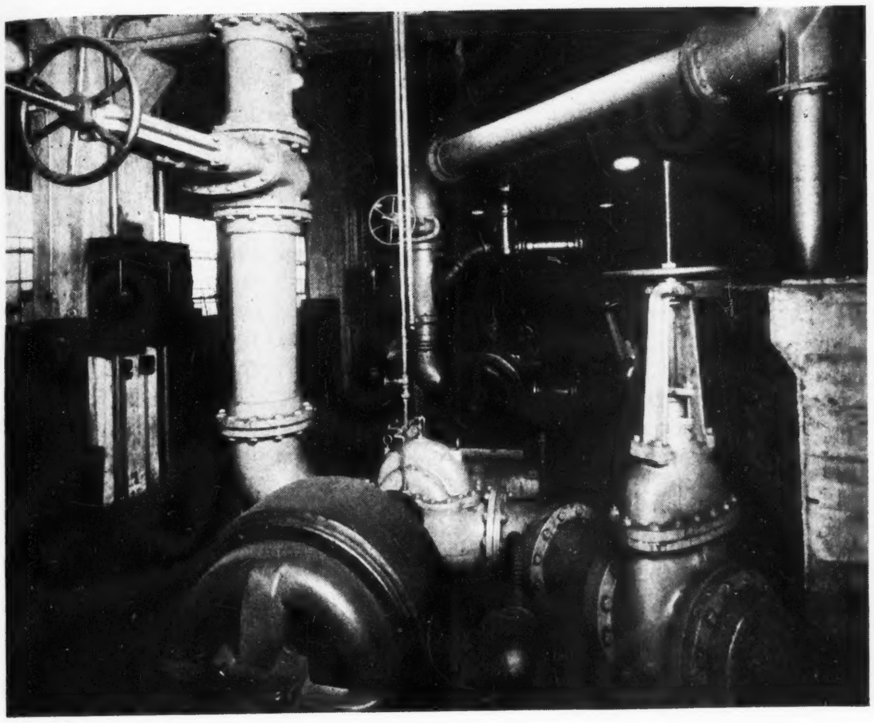
The switchboard panels consist of a West Penn Power Co. metering panel, one main meter and control panel for the coal company's main motor-operated incoming line switch, one synchronous condenser meter and control panel for setting the synchronous-condenser control equipment for automatic operation during the starting and stopping sequences, seven feeder control and metering panels with manually operated switch levers and two spare feeder panels. From the main and synchronous-condenser panels control wires lead to the motor-operated switches associated with the functions of these panels, located on the floor below. The manually operated switch handles of the feeder panels operate vertical tie-rods which extend through the floor to the switches mounted on the basement floor.

All the switchboard feeder panels are provided with exactly duplicate

Back Side of Control Panels on First Floor of Champion Substation (Left) Showing Tie Rods Which Extend Through the Floor and Operate the Switches Mounted in the Basement (Right)







Circulation Pumps and Drives, Champion Plant

equipment consisting primarily of an indicating ammeter, indicating wattmeter, induction-type overload relays, switch-operating handle and watthour meter. An important and unusual feature about the panels is the provision of meter and relay test jacks which permit easy, quick and safe testing of any relay or instrument without interruption or danger of interruption of service.

Four indicating and graphic instruments, three of which have Warren synchronous drives requiring no mechanical winding, on the main and synchronous-condenser panels provide accurate voltage, energy and power-factor records on the plant. The graphic voltmeter is equipped with an 8-day chart-driving mechanism to provide certain desirable time records when the power supply is off the system and the Warren synchronous-driven charts would of necessity be stopped. The only other piece of equipment on the upper floor is the synchronous condenser. It was placed here to assure inspection of its bearings whenever the switchboard man made his rounds to take periodic meter readings.

All the oil circuit breakers—except the motor operated ones for the synchronous condenser—and the power busbars are located in a unit in the basement of the substation. As the main busbar structure is located directly under the control panels on the upper floor it was readily possible to run the interconnecting control wires to the meters, relays and switch handles on the switchboard.

The synchronous-condenser control switches are mounted in a separate unit in the basement in such a position that the condenser leads rise vertically to the condenser on the floor above.

The load leads of the feeder switches loop from the switches to conduits set in the floor adjacent to them. These conduits pass out of the building underneath the ground and extend in this manner to a distributing point inside the main plant. Carrying the feeder cables in this manner is both unusual and desirable around a plant of this size, and it provides a degree of safety and protection not attainable by other means.

Nine feeder circuit conduits are provided for carrying conductors to the plant from the substation. At present seven of these conduits are in service and spare conductors are available in the other two conduits.

The distribution of power to the various parts of the plant is arranged so that all equipment performing a given function operates from one set of conductors. This arrangement makes it possible to keep accurate records of the power consumption and operating characteristics and provides a means of comparison between various parts of the four plants.

Pumping constitutes one of the main power loads of the plant. Two DeLaval "dirty-water" pumps each equipped with 60-hp. motors and two "clean-water" pumps provided with 100-hp. motors circulate the water through the system. These units are so interconnected on their water ends that a spare pump for either service is normally available.

Aside from the usual crusher, conveyor and elevator drives, special electric controls are provided for such work as automatic coal sampling and continuous boom loading and for operating the Gordon-Davis heat drier, Carpenter centrifugal driers, Laughlin filters and Worthington air compressors for the automatic lubrication system. Another important service performed by the system is that of operating the 27 Buffalo Forge Co. building-heater units.

Quite a variety of conditions had to be met in providing adequate and safe lighting. Westinghouse lamps are used throughout, and at the rotary dump or wherever dust is encountered, vapor-proof fixtures were installed. Inside the plant many angle-type reflectors were required to suitably light the machinery, troughs and aisles. Breakage or damage to lamp filaments by vibration was reduced by equipping all lamp sockets with Benjamin Electric shock-absorbing springs.

Large floodlights are provided for lighting the railroad tracks at the dump and for illuminating the incoming and outgoing sections of track under the loading booms. These powerful 1,000-watt lamps, are located high in the structure to prevent glare in the eyes of the outside plant workmen or trainmen along the tracks. By placing them inside the structure away from wind, ice or snow and providing holes in the siding for the emission of light, the life of the lamps is materially increased. At the same time ready access for focussing the beams is insured.

Each of the four new coal cleaning plants, although performing quite similiar service, presented many different electrical problems. At Warden the new plant had to be co-ordinated with a tipple and mine-car dump already in service. Warden also has a 75-hp. aerial tramway for bringing coal from the Ocean mine, and a system of coal bins at both the Warden and Ocean ends, which differentiate it from Champion.

Though space at Warden was extremely limited the location of the substation was highly satisfactory. Situated on a hillside near the plant, it is in a position where it in no way hampers expansion or changes in the preparation plant. In addition, it eliminated the necessity of carrying the 25,000-volt main supply lines through or into the territory imme-

diately surrounding the plant, where heavy train movements are encountered. At Warden the reserve water supply tank is kept filled by an automatic electric control system and gage lights are provided, similar to those at the other plants, to enable the operators to determine the quantity of water in the tanks by day or night.

The automatic electric control at all these plants and its high degree of successful operation is outstanding. Although little opportunity was offered for wearing in the equipment more than 125 motors at the Champion plant were first started Sept. 23, 1928, and after a full afternoon's run only one motor bearing was found to be slightly warm. The control functioned so perfectly that the presence of electrical equipment in the plant was almost forgotten.

The Banning preparation plant differs rather broadly in some respects from the other plants in so far as main substation equipment is concerned. Its location avoids carrying the 25,000-volt line an undue distance in the mine yard and also places it near the load center of the new and old plant equipment. At the same time the necessity for special line construction over the railroad tracks between the old tipple and new preparation plant is eliminated. The feeder cables cross the railroad in the upper part of the coal-loading structure extending across the tracks.

Power is supplied by three 667-kva. Pittsburgh transformers owned by the coal company and is distributed from a Westinghouse switchboard. Here, as elsewhere, the arrangement and location of the substation is such that none but underground feeders leave the building. Accordingly, it is possible to handle many of the old feeder circuits through an underground conduit system. While the plant equipment is quite similar to that at Warden, the acidulous nature of the river water made it necessary to employ special pumps for this service. Barrett - Haentjens pumps equipped with anti-friction thrust bearings are used.

Who Built the New Plants

By C. E. Lesher

Executive Vice-President
Pittsburgh Coal Co.

IT IS fitting here to record the names of those chiefly responsible for the splendid record in design and construction of the new Pittsburgh Coal Co. cleaning plants. The Pittsburgh Coal Co. itself assumed general over-all responsibility for layout and general design. J. B. Morrow, reporting to the executive vice-president, was in direct charge of the three installations, working in close co-operation with E. S. Taylor, chief engineer, and A. B. Kiser, general superintendent of mechanical equipment.

Engineers of the American Rhéolaveur Corporation, and in particular Guy V. Woody, vice-president; M. Jadoul, M. Moeller and R. A. Nagel, were largely responsible for working out so successfully the details of application of the Rhéo process to the particular problems, and designed the Rhéo launders and accessory equipment. J. B. Morrow, assisted by these engineers, planned the flow of coal through the cleaning plant and specified the type and size of machinery for each operation.

Allen & Garcia were retained as consulting engineers and to them fell the major portion of all the work, for they handled the detailed design and field construction. It was stipulated when this firm was retained that they would move sufficient office organization to Pittsburgh to handle this work. The American Rhéolaveur Corporation likewise opened Pittsburgh headquarters. Because those doing the actual work were thus able to keep in daily touch and in personal contact with the field work, time was conserved and better results obtained. Andrews Allen personally directed the work of his organization, which was in the immediate charge of Wm. M. Von Meding, ably assisted by H. F. Hebley, A. W. Holmes, G. V. Chapman and P. W. Matthews. Particular credit is due Alva Cartwright, Allen & Garcia construction superintendent, who erected Champion plant and is now putting up Banning, and G. O. Patton, who in 1925 erected Warden tipple and in 1928 the Warden preparation plant.

I. G. Lovering, engineer; T. J. Wardell, superintendent of Champion; A. E. Burgesser, superintendent of Warden, and J. E. Sherman, superintendent of Banning preparation plants, have been closely associated with the construction of all three installations. The work of R. M. Gordon, lubrication engineer of the coal company, is described elsewhere in this issue. A. A. Archer, assistant engineer, prepared ground layouts and established track alignments and grades. R. B. Hezlep, field engineer, was the direct representative of the chief engineer in the field.

INSTALLATION of electrical work was directed by E. J. Gealy, electrical engineer of the coal company. Field installation was handled swiftly and efficiently by employees of the company directed by A. W. Wilson. Splendid work was done by a number of contractors, particular mention being due the McDonald-Spencer Engineering Co., which designed the raw-coal storage bins and erected in remarkably quick time the concrete work at both Warden and Banning plants, and to A. G. Rothey on excavation and miscellaneous concrete work at Champion. McKelvy-Hine Co. was the contractor for concrete work. Officials of the Pittsburgh & Lake Erie and of the Montour railroads were helpful at all times. The trying and difficult task of co-ordinating and handling purchases was successfully accomplished by R. W. Mackensen, purchasing agent of the company. Accounting has been under W. L. Laramy, the auditor of the coal company.

Co-operation of exceptional character was given by the Pittsburgh Engineering, Foundry & Machine Co., contractor for the fabrication and, in part, the erection of steel for both Warden and Banning plants and aerial tramways. This engineering firm detailed, fabricated and erected the steel for the aerial tramways from the plans and specifications of F. C. Carstarphen, consulting engineer.

It is useless to attempt to assign credit specifically for all that has been done. Responsibility overlapped, ideas and suggestions sprang from every quarter, were developed, accepted or rejected and the work pushed along. The spirit of co-operation throughout has been splendid and every man has taken pride in his work and the results accomplished. It is significant of the thoroughness of the planning, and of the accuracy of the original research work on which the designs were based, that as each plant has been started the technical result of cleaning has exceeded that specified.

How Mechanical Preparation and Blending Click With Modern Merchandising Program

As told by
Hal E. Booth

Vice-President in Charge of Sales
Pittsburgh Coal Co.

THE MODERNIZATION PROGRAM of the Pittsburgh Coal Co., which touches its latest peak in the new central cleaning and preparation plants described in preceding pages of this issue of *Coal Age*, presents both an opportunity and a challenge to the sales department of that organization. The opportunity lies in giving satisfaction to coal consumers. To build a merchandising program which will give full recognition to the added value to the consumer in delivering him a "trouble free", custom-tailored product and to the capital investment and plant operation necessary to insure such delivery is the challenge.

"From the sales viewpoint," says Hal E. Booth, vice-president in charge of sales for the company, "the greatest single advantage these plants have for us is the opportunity they give to satisfy consumers. Nothing is more destructive to the morale of the man on the firing line in a highly competitive market such as exists in bituminous coal than to start his sales day facing a complaint that 'the last car you shipped me' was not up to the standard of the car before in quality or in sizing. It means the intrusion of apology and doubt where there should be only enthusiasm and confidence.

"With the constant laboratory control of the product being delivered by the launders and the air tables at the Pittsburgh Coal Co., plants, we have the daily assurance not only that these plants are designed to give us coal of a certain predetermined quality but that they actually are doing that very thing. So the salesman knows that, if his customer is demanding a 5- or a 6- or a 7 per cent ash coal, that is the coal that is being loaded out on that order. With the elaborate provisions for mixing and resizing, he knows, too, that he can deliver any blend of sizes in just the exact proportions which experience has shown to work most efficiently under the boilers or in the retorts or furnaces of the user.

"IN THIS way we are driving out the bugbear of varying quality and varying sizes in shipments to a consumer who has demanded coal of a specified quality and a specified grade or mixture. By so doing we are bringing coal merchandising in line with modern salesmanship in other commodities. We are approaching the ideal of the packaged goods where the package you buy today is the same as the one you bought yesterday and the one you will purchase tomorrow will not vary in content or grade from that which you received today.

"In other words, these cleaning plants permit us to do two things:

"(1) To prepare a product which will meet the individual specifications of the individual buyer; and then,

"(2) To standardize subsequent deliveries to that individual buyer.

"Cases, of course, will arise where the buyer for one reason or another —sometimes valid, sometimes invalid —will feel he has a cause for complaint. When these cases, which are diminishing in frequency, do arise, however, the salesman who is contacting with that particular customer has the definite assurance and knowledge that the handling of that complaint at headquarters will be neither a routine nor an inconclusive affair.

"To handle these complaints the sales department employs men who have had both practical operating experience and the sales viewpoint and psychology. Because of their previous background these men can talk to the operating department in the language of that department and, if need be, conduct their own investigations independent of the operating personnel. Under this system complaints are neither ignored nor lost in buck-passing between the operating and the sales departments. Every complaint is followed to a conclusion and its justification or lack of justification definitely nailed down."

THE mechanical preparation program launched by the Pittsburgh Coal Co. was adopted only after an exhaustive study of the chemical and physical characteristics of the coals themselves, how best these coals might be treated and what advantages such coals so treated might reasonably be expected to enjoy in competitive marketing. Of course, increased volume or sales at a better margin is the goal of every major and most minor advances in operating technique and mining practices. The dollar theme is dominant. The impulse for the program was a sales impulse. The program having been launched, the problem before the sales department is how to tie in and cash in most effectively.

In the development of these objectives major emphasis has been placed upon the intensification of two phases of the general merchandising program of this company as outlined in these pages several months ago (*Coal Age, Vol.* 32, p. 241). These phases are market analysis and combustion engineering service to the consumer. Some time ago the Pittsburgh Coal Co. made a detailed study of coal con-

sumption in the markets which it then reached or desired to reach and the character of the consumption in each of those areas. This now has been carried a step further by the establishment of sales quotas for each territory and for each salesman.

There is nothing perfunctory in the way these quotas have been set up. A salesman is not merely told that he is expected to sell so many thousand tons of coal this year. His quota sheet covers grades and sizes distributed monthly over the year. The quotas for individual salesmen are further broken down into individual customers so that the responsibility does not end with meeting the quota in gross tonnage but is carried on to sales or specified quantities of specified grades and sizes to specified individual consumers. In other words, the salesman is not left with an overall mark to shoot at; his quota is so subdivided that he can and must concentrate his efforts upon specific prospects and specific customers. Such refinement of quota selling, of course, brings to the work a keener sense of direction and permits much more effective supervision of and check upon the activities of the individual salesman and developments in individual sales territories.

A HIGHER degree of specialization is a natural corollary of such a system. It is recognized that the problems and the methods to be employed in selling to the industrial consumer differ widely from those to be employed in selling to the retail coal merchant. Different considerations influence sales; a different type of sales help is needed. The appreciation of this fact is crowding out of the picture, the general salesman who called upon a retail merchant this morning, a large industrial consumer this afternoon, a steel mill tomorrow and a coke or some other process plant the day after. Industrial and retail coal selling have been divorced in the sales program of the Pittsburgh Coal Co.

In seeking to widen the market for coal for domestic consumption the Pittsburgh Coal Co. is studying individual coal markets and seeking to discover why the householder in certain communities prefers certain sizes and grades of fuel. An effort is being made to work out selling methods which will flatten out the peaks in retail buying and delivery to the domestic consumer. In these studies the company has the opportunity of using its own retail department in the City of Pittsburgh and its subsidiary and affiliated companies in the Northwest as experimental laboratories for practical test of the plans it develops.

THE industrial market, which absorbs by far the greater part of the coal produced by the company, has two clashing complexes. It is intensely critical of quality, but so many purchasing agents still suffer from a bad case of price complex that it often is extremely difficult to make them see price and quality in their proper relationship. In the case of the Pittsburgh Coal Co. industrial selling the problem is still further complicated by the necessity of persuading the buyer that old yardsticks cannot be used to measure a new product. The duties of persuasion fall upon the combustion engineering staff of the company.

What their problem is was outlined recently by J. D. A. Morrow, president of the Pittsburgh Coal Co. In a statement on modern coal selling, prepared for the National Association of Purchasing Agents, Mr. Morrow said:

"We started out with the proposition that we engineer our coal for the market. This presupposed accurate and scientific knowledge of the chief uses and conditions of use to which the coal will be put. It also presupposed that the buyer generally prefers pure to impure fuel. After we had studied our markets we formulated our program. This first involved the construction of combined cleaning and preparation plants to dress our product to the user's requirements. It next required the reconstruction of our production department to conform to the new standards and kinds of output."

THESE steps, being in the control of the company, were relatively easy of accomplishment. It has not been so easy to reconstruct the mental attitude of some buyers or to persuade them to abandon old standards in the judgment of a new product. By actual demonstration, however, the combustion engineers of the company have won some notable victories in their campaign to prove that overall plant performance is a more reliable index of results than blind reliance upon ash percentages, fusion temperatures and the old B.t.u. standby. These victories have been possible because the aim of the new sales program is to fit the coal to the individual plant requirements and not the plant to the coal for sale.

At one such plant the purchasing agent formerly burned a miscellaneous lot of coals, being guided in his purchases largely by considerations of reciprocity. After a plant study and analysis one of the Pittsburgh staff recommended one of the new mechanically cleaned sizes of coal prepared by his company. Although the delivered cost of this fuel was somewhat higher than the average previously paid for a constantly changing variety of coals, plant operation results showed that the purchaser was saving money by sticking to one grade specifically suited to his particular requirements.

In another case mechanically cleaned stoker coal was proved to be more efficient than nut-and-slack although the stoker coal cost more per ton than the nut-and-slack, which was averaging $1.35. In this case it was found that the use of the stoker coal permitted the company burning it to discontinue the use of some old, inefficient boilers formerly required to carry peak loads. In another case mechanically cleaned coal with a fusion point of 2,400 deg. elminated clinker troubles and high maintenance costs experienced with a nut-and-slack coal having a fusion temperature 200 deg. higher.

BY THE multiplication of such experiences in individual plants the sales department is accumulating a mass of data which enables it to merchandise the coal just as scientifically as the product is prepared. The criticism has been made by spokesmen for the buyer that too many coal salesmen are unable to meet the test of adequate engineering knowledge of the product they are trying to sell; that the salesman lacks the information and experience which fit him to take his coal out of the price class. This is a criticism which the sales department of the Pittsburgh Coal Co. is seeking to avoid by maintaining a staff that can really counsel with the buyer on his fuel problems.

The modernization program of the company was undertaken to meet a specific need for coal which would satisfy a quality market. The sales program of the company has been keyed into this larger program in order to properly capitalize upon the improvements which the organization has made in its preparation, sizing and cleaning. A new era in preparation demands a new era in selling, and that is what the sales department of the Pittsburgh Coal Co. is trying to usher in.

LUBRICATION

Made to Do Full Duty in Assuring Continuous Operation

By Robert M. Gordon

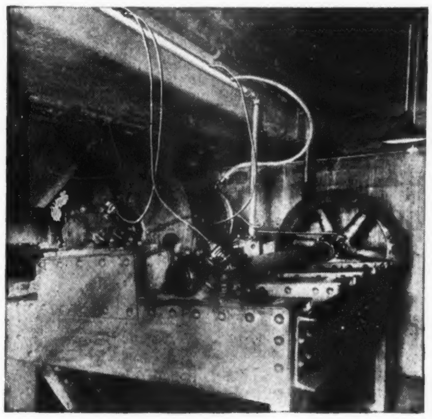
Lubrication Engineer,
Pittsburgh Coal Co.

WHEN the Champion preparation plant of the Pittsburgh Coal Co. was designed, proper lubrication was relied on to keep it producing at 650 tons per hour without time loss due to replacements of worn bearings, cracked wrist pins, etc. Bearing failures usually result from faulty lubrication. Faulty lubrication in turn may be traced to unsuitable lubricants, improperly grooved bearings, inaccessible grease cups or clogged or stolen grease guns. In addition, the greaser may be called away to help with other work; the regular man may be off for a day or two, his place being taken by an inefficient worker or he may have been taken off by a plant foreman who wants to cut his overhead and his work divided among others who may already be working to capacity. At Champion the lubricating system was worked out to guard against such failures.

The first step in the lubrication program was correctly designed bearings. In many of the bearings the pressures are high and they operate in alternate directions at an increased rubbing speed. This type of bearing is one of the hardest to lubricate and, where possible, the shafts were drilled and the lubricant forced onto the rubbing surface from the inside; where this was not feasible the bearing segments were chamfered so that the grease could be applied at the point of least pressure, to be wiped into the pressure area by the motion of the shaft.

For the actual lubrication of the bearings the "Ideal" pressure system was installed. Grease is pumped directly from the barrel to a distributor and from there is forced by air pressure, through header lines, to the bearings. A regulating valve, which controls the feed, is placed in the line at each bearing. Properly adjusted, this valve maintains a constant flow of grease and eliminates the human element.

With hand methods too much lubricant usually is applied when the bearing is first greased. This means grease has been wasted and, in addition, that grease friction has been built up, increasing power consumption. Operation uses up the grease until the point of minimum friction is reached. Beyond this point, until the greaser again appears, grease friction disappears and metal friction gradually increases until the bearing becames hot and distorted. Proper regulation of the "Ideal" valve keeps a bearing running with minimum friction; grease is saved and heating and distortion prevented.



Forced Lubrication: Clean Grease to Every Bearing

Practically all bearings at Champion are lubricated in this manner. Ten distributors are in use, each distributor feeding grease to one unit or, where the units are small and close together, to a group of units. The number of bearings fed by each distributor varies from 29 to 78.

The distributors, with due regard to accessibility, were placed as nearly as possible in the center of the group of bearings they are to serve.

From each distributor, header lines of $1\frac{1}{2}$-in. galvanized iron pipe, with a minimum of bends, were run around the units as close to the bearings as possible. From the header lines copper tubing was run to the valves, screwed into the bearing caps. On cranks, eccentrics and moving shafts, grease-proof rubber hose was used. Over half a mile of header line, 1,000 ft. of copper tubing, 300 ft. of hose and 450 regulating valves were installed.

Ordinarily it would take one man at least two days to properly grease each bearing once by hand methods. With the "Ideal" system he easily handles the whole job. Grease economy is a natural result. A typical unit, serving the rotary dump and feeders, uses about a pound of grease every eight hours of operation and lubricates 45 bearings. As Champion has used this system from the start no comparative figures are available. However, changing other Pittsburgh Coal Co. operations over to the new system has shown savings in grease of from 40 to 70 per cent.

IN addition to the "Ideal" lubricators, 200 spring-actuated "Unaflow" cups, which feed grease at a constant rate, are used on all secondary bearings and on small isolated units. By eliminating the hand compression cups one man can attend to all these auxiliary bearings and also to the gear, pinion and rope lubrication. The rollers for the raw-coal belt conveyor, Carpenter driers and the refuse crusher are equipped with Timken bearings. These, of course, require very little attention.

It is a significant fact that the actual power consumption is considerably less than the original estimate. Perfect lubrication—lubrication without waste—has been the goal. The proper amount of clean grease fed through a closed system to all bearings and the reduction of the human element to a minimum not only has effected a saving in labor but has provided lubrication insurance for machinery that was designed to run 60 minutes every hour.

National Mining Institute

Throws New Light on Industry's Technical Difficulties

NEVER does the American Institute of Mining and Metallurgical Engineers assemble without clarifying some of the many vexing problems puzzling the coal industry. The meeting of Feb. 18-21 at New York City was no exception. The sessions on ground movement and subsidence were more than usually thought-provoking. A long article carefully prepared by Walter Herd, chief engineer, Dominion Coal Co., Glace Bay, N. S., raised the whole question of roof action and will serve as a text for comprehensive studies on the manner and the cause of the failure of the mine roof and on the nature of those arching strain polygons which move silently from the weakened and unresisting supports to those able to withstand the pressure.

The declaration of Wallace Thorneycroft, chairman of the committee on subsidence of the Institute of Mining Engineers of Great Britain, to the effect that the roof actually rises over the pillar when the coal is mined nearby answers effectively those who for years have denied that any such action was conceivable and questioned whether the roof cover ever acted as a beam.

Nothing final came out of the deliberations of the ventilation committee, but the draft that was submitted for a future code was discussed energetically and interestedly for five hours, with the result that it seems probable that a document will be produced acceptable to at least a majority of members.

Alexander L. Hay's paper on the coal-mining operations in the Sydney coal field, where he is assistant mining engineer, contained facts outlining the difficulties of mining areas far from land with heavy cover and with a swelling roof. In discussion it was shown that the bulging of the roof greatly exceeded its expansion and that droop did not increase in proportion to the increased length of the curve which the roof assumes as it expands.

A notable discussion on explosions followed the paper read by T. C. Thomas, mine inspector, Lehigh Coal & Navigation Co., and at another session a discussion as to the definition of clean coal led to the formation of a committee to define what is entitled to that designation.

What Are Bumps and Why Do They Occur?

WHEN mines reach a depth of 2,000 ft. or more below the surface, strange phenomena may occur. It was the task of Walter Herd, mining engineer, Dominion Coal Co., Glace Bay, N. S., at the meeting of the ground movement and subsidence committee of the American Institute of Mining and Metallurgical Engineers, held in New York City, Feb. 18, to discuss the bumps that manifest themselves at the No. 2 mine, Springhill, and the means that had been taken to render those bumps harmless. Walter Herd, being ill, was unable to be present, but the paper was briefed by T. L. McCall, assistant mining engineer of the same company.

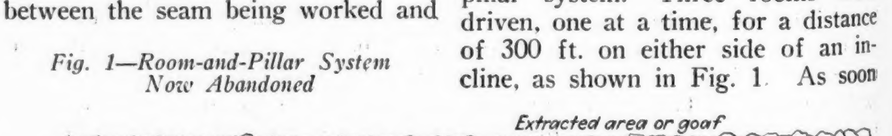
Bumps, according to Mr. Herd, are sudden burstings, accompanied by a loud report, of the coal or the strata immediately in contact with it. The seam at the mine in which the bumps occurred is 9 ft. thick and of medium hardness with no well-defined cleavage. Down to the 2,400-ft. level, it is on a pitch of 30 deg. There it is folded vertically downward for 100 ft., the direction of the fold following the strike. Thereafter the inclination generally flattens to 20 deg. This is the ruling pitch of the present workings, which lie under 2,300 and 2,800 ft. of cover.

The roof consists of 9 to 16 ft. of strong sandy shale and the floor for 9 to 20 ft. of a strong shale of like character but weaker than the roof. Sandstone bands of great thickness occur and disappear in roof and floor within short distances, often a few hundred feet. Those in the roof between the seam being worked and the next above may be as much as 73 ft. thick and those in the floor reach a thickness in one place of 36 ft.

The faults are rare and small. Mr. Herd says that "there does not appear to be any undue initial stress in the strata due to faults or folding." The seam is not highly gaseous and not liable to outbursts of gas.

The first bumps of any severity occurred between the 4,000- and 4,700-ft. levels where the coal was under 1,900 ft. of cover and when the mine was being operated on the room-and-pillar system. Three rooms were driven, one at a time, for a distance of 300 ft. on either side of an incline, as shown in Fig. 1. As soon

Fig. 1—Room-and-Pillar System Now Abandoned



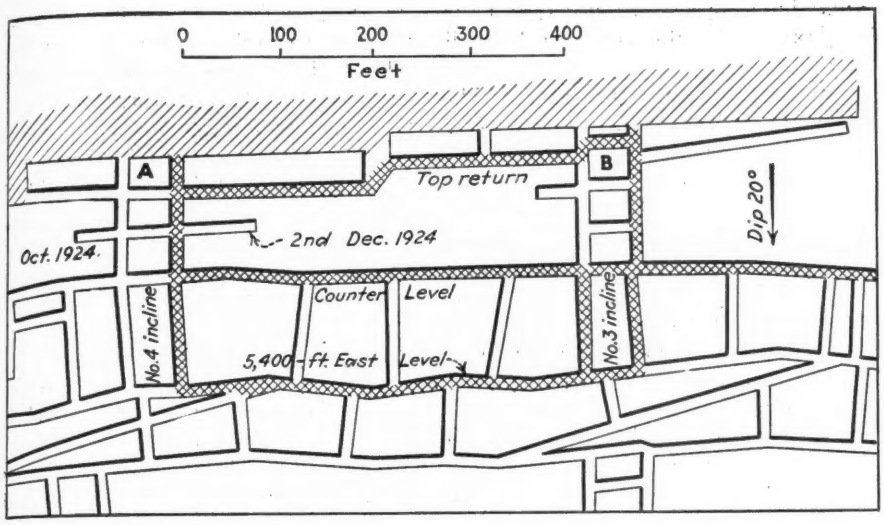


Fig. 2—Cross-Hatched Roadways Were Affected by Bump of Dec. 6, 1924

as the top room reached the goaf on one side of the incline and its predetermined distance on the other, the pillar was drawn and when extraction had continued to the incline another narrow room was started lower down.

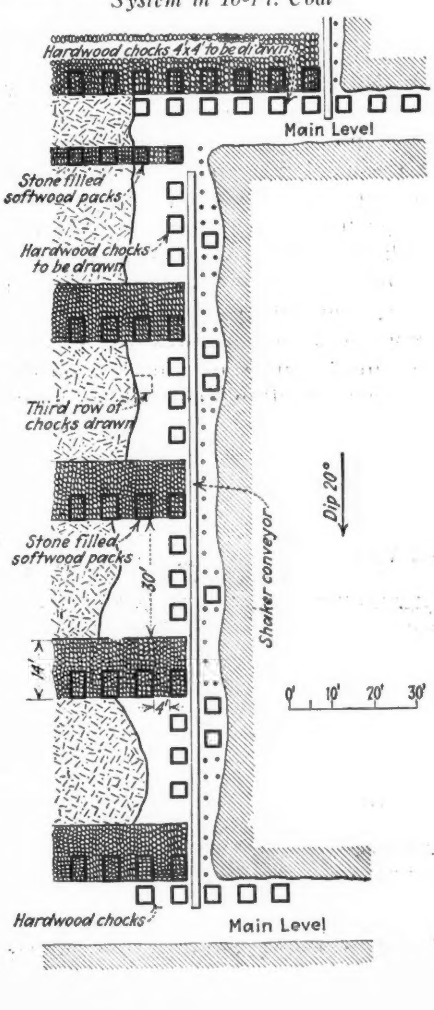
Bumps might occur at any time while the room was being driven, but after the extracted area was reached and the pillar was being drawn bumps did not occur. The bumps caused coal to be suddenly thrown from the rib either on the high or low side at or near the working face, the low-side bumps being of greater intensity. There was no evidence of a break in the floor. In driving a room parallel to the extracted area, the bumps could often be transferred from the low to the high side or vice versa by increasing or diminishing the pillar thickness between room and goaf. When inclines were being driven up to the excavated area bumps of similar nature would occur till the pillar was pierced. As the area excavated increased the bumps were liable to occur at points further from the edge of the goaf.

Bumps later occurred in the extracted area. These caused practically no damage in the mine and were often unnoticed underground but caused apprehension on the surface, tremors shaking buildings as much as two miles from the supposed point of origin and a half mile beyond the outcrop of the seam.

Worse yet, a third type of bump known locally as a "district bump" appeared at 2,050 ft. of cover, affecting roadways driven in solid coal to the dip of totally extracted areas. These extended over a few acres, often closing portions of rooms with coal dislodged or pushed from the rib on the high or low side of the roadway, damaging inclines and main levels some considerable distance from the edge of the excavated area, but rarely affecting the working faces.

The largest district bump under the room system occurred Dec. 6, 1924, in the 5,400-ft. east level at a depth of 2,200 ft. It caused a distinct and alarming movement in the town two miles distant and instantly closed several hundred feet of levels and inclines. For the first time the breaking of the floor was definitely noted.

Fig. 3—Successful Retreating Longwall System in 10-Ft. Coal



Referring to Fig. 2, which shows the position of the workings at the time of this district bump, the level was completely closed from inclines 3 to 4, the rails being thrown against the roof and held there by coal and broken floor rock. Incline 3 was closed with coal up to the counter level and from that level to room 7 heavy falls of rock completely blocked the roadway. The counter level between inclines 2 and 3 was nearly closed by coal thrown off the high side. The counter level between 3 and 4 was completely filled, but even before the bump this roadway was almost closed from coal which had spalled off the rib on the high side. The top return from incline 3 to 4 —*AB* in Fig. 2—was completely closed, the floor having heaved.

After this district bump no more rooms were driven in the vicinity of such extracted areas as were subject to bumps and preparations were made to extract the coal by longwall retreating.

The abandoning of the pillars between the extracted area and the main level, which were to some extent shattered by the bump, was at the time deemed prudent. Subsequent experience, however, has proved that a major or district bump never recurs in an area which has been previously shaken by a bump and, instead of being hazardous as at one time thought, the extraction of the pillars would have been a safer operation than similar work in firmer ground.

That district bumps did not occur at lesser depths than 2,050 ft. is explained by recent drilling to tap the flooded areas in the seam above. These revealed that the massive sandstone bed disappeared to the rise of the 4,000-ft. level.

After this suspension of room driving, bumps in the extracted area continued to occur about ten times a year. Local bumps in the coal also occurred with lessening severity. They seemed to be distributed haphazard and were mostly from the high side, throwing sometimes as much as 20 tons of coal from the upper rib, but occasionally one would occur on the low side. The general trend was away from the extracted area but at times one would occur nearer to that area than the one that preceded it.

When longwall retreating was established, roof breaks, often reaching over the coal, occurred at the working face with about every 40 to 60 ft. of advance. These occasionally closed the face. When the wall had advanced nearly 200 ft. bumps again

appeared in much the same form as heretofore, showing sometimes in roadways previously driven in the solid coal and occasionally on the wall faces. A few of these phenomena had the typical characteristics of a low-side bump in a roadway driven in solid coal—conveyor pans and chocks were thrown from the face, the latter usually being found intact in their new position.

Finally, the method of support shown in Fig. 3 was adopted. Since its introduction face bumps have ceased. The strengthened packs may seem slight when the seam thickness —here 10 ft.—and the depth of cover are considered, but the immediate roof is of exceptional character. The roof grinds on these packs, making good building stone, and rarely breaks down across the walls closer than 10 to 12 ft. from the face, provided the packs are kept well forward. Heavy timbers under steel straps were tried in place of hardwood chocks, but proved more costly. The wall faces are worked double shift and advance $2\frac{1}{2}$ ft. per shift, or 5 ft. per day, chock drawing and pan moving ocupying the third shift.

On April 12 of last year a district bump occurred on the 5,700-ft. east level, where the cover was 2,500 ft. thick. Fig. 4 is a large-scale plan showing the effect of this bump on the roadways as measured at the time and probably its most interesting feature is the location, size and direction of the cavity in the pillar beginning at a point 215 ft. from the face at the time of the bump and extending laterally for 90 ft. At its maximum it measured 9 ft. across with a depth of 18 in. Its long axis is 35 ft. from the low side of the 5,700-ft. level in a pillar about 400 ft. long by 100 ft. wide. It will be noted that the cavity is not continuous but in three sections, denoting a wave effect, and the long axis is at right angles to the wall face.

Fig. 5 is a section across the 5,700,-ft. level, which was taken immediately after the bump, and of the cavity and crushed zone, which was taken some four months later when it was uncovered by the advance of the face. When mining across this cavity it was observed that the roof and 14 in. of coal immediately under the roof were intact and no different here than in other sections of the face but that the coal below it and on either side of its center line for 7 or 8 ft. was crushed in lines as shown in Fig. 5 and was perceptibly warm. Further, the floor had broken on the center line of this hole, pieces of floor rock being found turned upward into the crushed coal 2 ft. above the normal line of the floor, clearly demonstrating that the reaction took place through the floor, the cavity being formed when the floor subsided.

The roof must have moved but little, as props thrown out in the level were not broken. The floor in the center of the level was broken opposite the cavity and for a distance equal to the length of the latter. In recovering the level the extended portion of the coal had to be sheared off and was found as firm as in a room. A heavy air blast accompanied the bump, but that might well be expected for 500 tons of coal was suddenly thrust into the roadway. Much gas was emitted, but no more than might be anticipated from the instantaneous mining of this quantity of coal. The longwall faces were unaffected, not a stick of timber being out of place.

Other district bumps occurred later, confirming the idea that the long faces were comparatively safe. The most dangerous zone was on the main levels within 500 ft. of the working face, for here the coal might suddenly be extruded from the low-side pillar and the floor might break near the center of the roadway. To combat the danger incident to the extrusion of coal, 12 ft. was taken off the low-side rib; substantial stone-filled packs were built close to the track, leaving a clear space of 8 ft. between the new low rib and the low side of the pack into which the coal could extrude and thus give a chance of escape to anyone on the level.

About four years ago bench marks resting on hard rock were established over the workings and worked-out areas. The levels of these were taken every six months. During this period some 40 bumps occurred in the extracted area. They caused no damage underground ,but were felt in the town, which is situated beyond the seam outcrop. In addition, there were several district bumps. Nevertheless, the bench marks have not been lowered a fraction of an inch. This is suggestive of long arch spans in the upper rocks, which are of strong hard texture.

Just prior to a bump the working face becomes quiet. Knowledge of this has prevented many accidents. Low-side bumps are of much greater intensity than high side bumps and timbers are rarely broken. With the high-side bumps the timbers do not fare so well but the floor is not disturbed. After a district bump the affected area takes about 24 hours to quiet down. During this period the upper roof works heavily, although a fall rarely occurs. The upper strata make much noise, suggesting the tearing apart of rocks. The floor is subjected to frequent oscillations, which are distinctly felt when sitting on a prop which has been laid on the floor, the feeling being as if one were jerked upward.

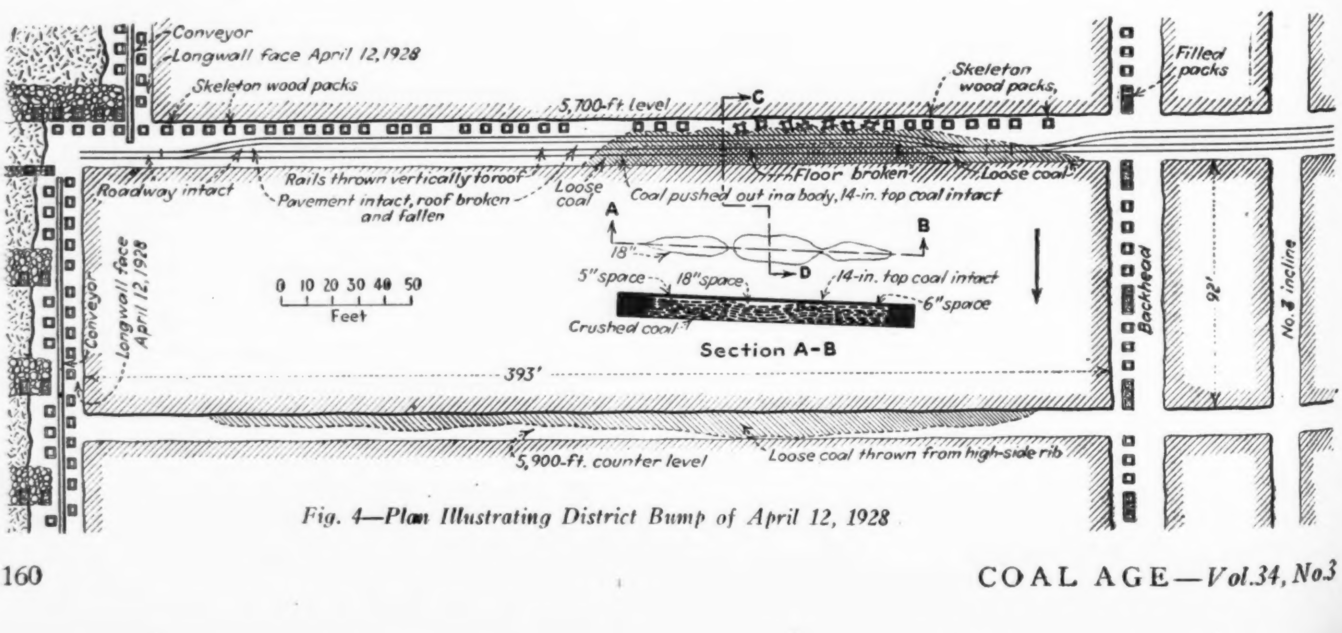


Fig. 4—Plan Illustrating District Bump of April 12, 1928

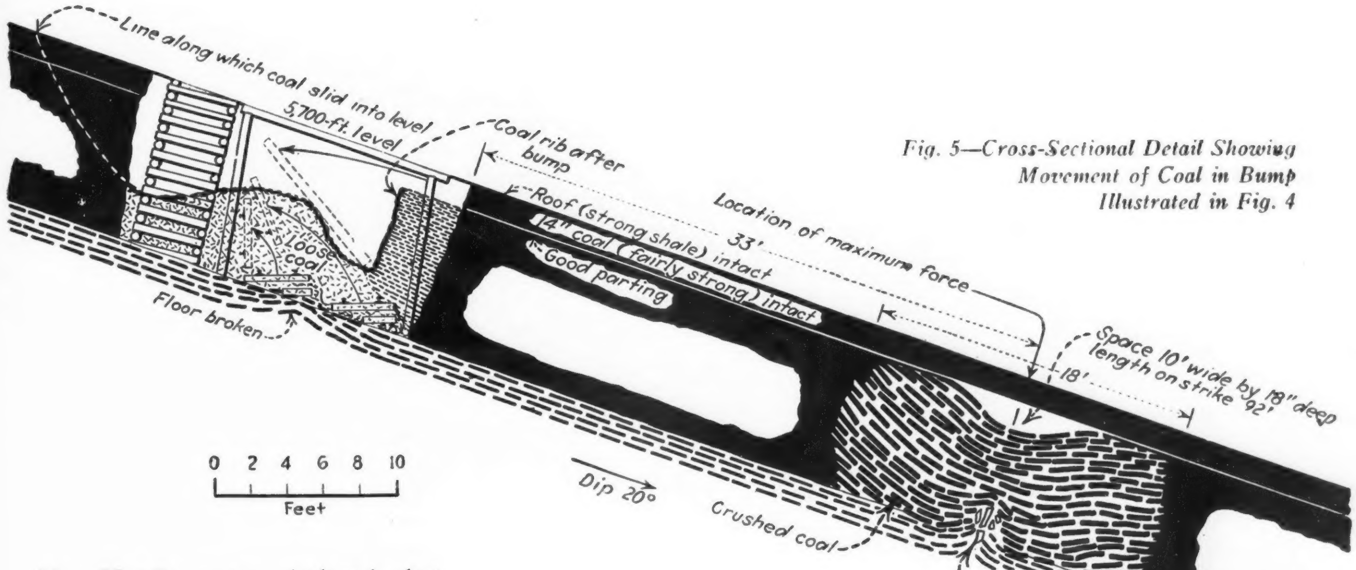


Fig. 5—Cross-Sectional Detail Showing Movement of Coal in Bump Illustrated in Fig. 4

Mr. Herd's paper declared that no known method of mining will eliminate bumps and allow of producing coal on a commercial basis, but it often is possible to establish conditions that may nullify or at least mitigate their effects.

Perhaps, said Mr. Herd, the main roadways might be driven in the strata under the seam, leaving about 20 ft. between the floor of the seam and the roof of the main road, immediately over which and for 20 ft. on either side of the center line of the main road the overlying seam would be extracted and two rows of stone-filled packs placed therein, a method adopted in some metal mines. The coal from the longwall faces could be taken a distance by belt conveyor to a chute connecting to the main road in the understrata.

George S. Rice, who presided at the meeting, said that while he concurred in what Mr. Herd had said about the bumps at the No. 2 Colliery, Springhill, he was moved to remark that bumps were not all the outcome of similar conditions and often manifested themselves in other ways, as Mr. Herd himself doubtless would be willing to grant.

The phenomena at Springhill seemed to be pressure bumps, whereas those at Crowsnest Pass he would designate as shock bumps. In the roof above the mines at Crowsnest seemed to be large cavities from the top of which the rock fell on to measures below, causing a shock, whereas at Springhill the breakage and slippage of measures under stress appeared to be the true explanation of the phenomenon.

Bumps seemed to occur where the coal, roof and floor were strong and the coal thick. Change any of the three so that they would yield under pressure and conditions favorable to a bump would be absent.

George Watkin Evans, consulting engineer, Seattle, Wash., discussing the Cassidy bump in Vancouver Island, said that it might have been possible to continue operations had longwall retreating been introduced as at Springhill.

Mining Raises the Roof

WHEN mining is approaching a point on the surface the ground rises a little, declared Wallace Thorneycroft, Plean, Scotland, in a paper read by George S. Rice at a meeting of the ground movement and subsidence committee of the A.I.M.E., Feb. 18. The maximum movement, he had observed, was about 2 in. Mr. Thorneycroft had hung plummets from the four corners of a building and measured the distance they hung clear of the walls. Mr. Thorneycroft is chairman of the committee on subsidence of the Institution of Mining Engineers, of Great Britain.

The paper of Henry Louis, president of that Institution, on "Findings of the Royal Commission on Mining Subsidence" reviewed the Mines (Working Facilities and Support) Act 1923 which gave the owner of mineral the right to remove it all, relieving him of the obligation of supporting the surface but requiring him to compensate the owner of the surface for any damage done. The Royal Commission declared that the small householder should receive damages even where the agreement relieved the mineral owner from any obligation to support the surface. In regard to future houses the purchaser or lessee of such property as carries no right for compensation done by the working of the minerals shall be informed by an indorsement on the conveyance or lease of the risk he is running.

L. E. Young, vice-president, Pittsburgh Coal Co., Pittsburgh, Pa., declared that mineral land which stood in the line of development of large areas should be made subject to compulsory purchase, especially where the operations of the company were likely to remove entirely the possibility of later removing the coal thus surrounded.

Eugene McAuliffe, president, Union Pacific Coal Co., Omaha, Neb., said that an educational campaign was needed to prevent surface holders from keeping as much as 41 per cent of the coal as pillars to support surface that in many cases was yellow clay in which nothing would grow.

Henry Louis declared that he had never noted draw over the extracted area—"negative draw," as some have

termed it—but he had noted "positive draw," the rupture over the pillar. R. D. Hall, engineering editor, *Coal Age*, declared that in Great Britain mining was mostly at depth and quite largely by longwall, conditions favoring rupture over the pillar rather than over the extracted area. He added that the mines, being under built-over lands, the effects of mining had been more generally observed than in wooded areas. These facts accounted for the differences in opinion between American and British engineers. Negative draw, Mr. Hall said, was a misnomer, for draw was due to tension, as the name implied, and failure at the surface above the extracted area was attributable to shear.

Two sessions on Feb. 20 were given to a discussion of the new mine ventilation code prepared by a committee of which A. W. Hesse is chairman. E. A. Holbrook presided. Some of the provisions were returned to the committee for revision. No final action on any clauses was taken.

Steel and Coal Men Argue Fuel Values

COAL and coal products occupied the attention of members of the Institute on Wednesday afternoon and Thursday. On Wednesday the coal and coal products section met in a joint session with the Iron and Steel Division, J. R. Campbell, bituminous representative, Koppers-Rhéolaveur Corporation, acting as chairman. At this time G. S. Scott, chief chemist, Koppers-Rhéolaveur Corporation, Wilkes-barre, Pa., presented a paper on "Coal Washability Tests as a Guide to the Economic Limit of Coal Washing." This paper was prepared to show that the highest economic purity of washed coal can be determined from washability studies of the raw coal, costs of mining and washing coal and data on the effect of ash and sulphur on the value of the coal for the particular use for which it is intended.

Coal to be coked and used in the blast furnace was chosen as an example and the problem was to determine what percentage, if any, should be rejected as impurity. The various factors entering the problem are: cost of mining, washing, transportation and coking, value of by-products and cost of taking care of coke ash and coke sulphur in blast furnace. The cost of coking was assumed to equal the value of the by-products.

As a lower yield of washed coal, with an accompanying decrease in ash and sulphur content, means a higher cost per ton of coke, the cost of coke will increase with decrease in impurities. But if the impurities are allowed to remain the cost of slagging them out of the blast furnace shows a corresponding increase. The effect of these various factors, for the problem assumed, is shown in Fig. 1, taken from Mr. Scott's paper. Here it was found that the most economical recovery was 88 per cent. In inter-company business an opportunity is employed to adjust the washing cost and the cost of slagging out

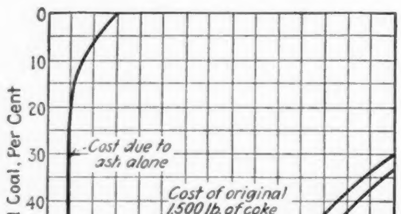


Fig. 1—Summary of Cost Data

Curve 1, cost of blast-furnace fuel per ton of pig iron at various washed coal recoveries, assuming coke ash- and sulphur-free. Curve 2, additional cost due to presence of ash. Curve 3, additional cost due to presence of sulphur. Curve 4, combined effect of all factors.

impurities—not to the interest of either division—but for the good of the company as a whole.

The next paper, "A Test for Measuring the Agglutinating Power of Coal," by S. M. Marshall, consulting engineer, and Byron M. Bird, Bureau of Mines, was presented by A. C. Fieldner, of the Bureau of Mines. This paper was devoted to the description of a method of testing the agglutinating power of a coal by mixing it with a standard quantity of inert material—sand, in this case.

The discussion on the first paper brought out the fact that the effect of increase in volatile matter and moisture in the washed coal should be considered. The paper, according to the general opinion, should serve as a starting point, though what is really needed is a systematic study of the methods by which the characteristics of a coal may be evaluated for the purpose for which it is to be used. Study of the fractions of a seam by means of sink and float methods were held to be of considerable importance. According to those present, uniformity of product, from the standpoint of both coking and industrial use, is an advantage which washed or air-cleaned coal has over that prepared by other methods.

In regard to the test for the agglutinating power of coal, remarks following the presentation of the paper brought out the fact that laboratory results are not a true index of its performance in the blast furnace. The latter is influenced by furnace practice, the size of the coal and its moisture content.

"The Hydrotator Coal-Cleaning Process," by W. L. Remick, general manager, Hydrotator Co., and George B. James, assistant superintendent, Candlemas Colliery, Haddock Mining Co., was the only paper given in the Coal and Coal Products meeting on Thursday morning, at which J. B. Morrow, research engineer, Pittsburgh Coal Co., presided. This was followed by a general discussion on the definition of clean coal.

Barley coal, stated Mr. Remick, who read the paper, is finding increasing favor. It usually is shipped, however, with the maximum undersize and oversize allowable. The excess

Screen Analysis, Barley Hydrotator Products

	Feed Coal		Clean Coal		Refuse	
	$+\frac{3}{16}$ in.	$-\frac{3}{16}$ in.	$+\frac{3}{16}$ in.	$-\frac{3}{16}$ in.	$+\frac{3}{16}$ in.	$-\frac{3}{16}$ in.
Percentage weight	74.4	25.6	85.2	14.8	92.4	7.6
Percentage ash	23.2	25.3	12.5	18.5	68.6	60.5
Average ash	2.37		13.4		68.1	

Sink and Float Test, 1.7 Specific Gravity

	Feed Coal		Clean Coal		Refuse	
	Float	Sink	Float	Sink	Float	Sink
Percentage weight	70.6	29.4	88.4	11.6	9.8	90.2
Percentage ash	10.5	50.3	8.5	46.8	10.9	74.4
Average ash	23.1		12.9		68.4	

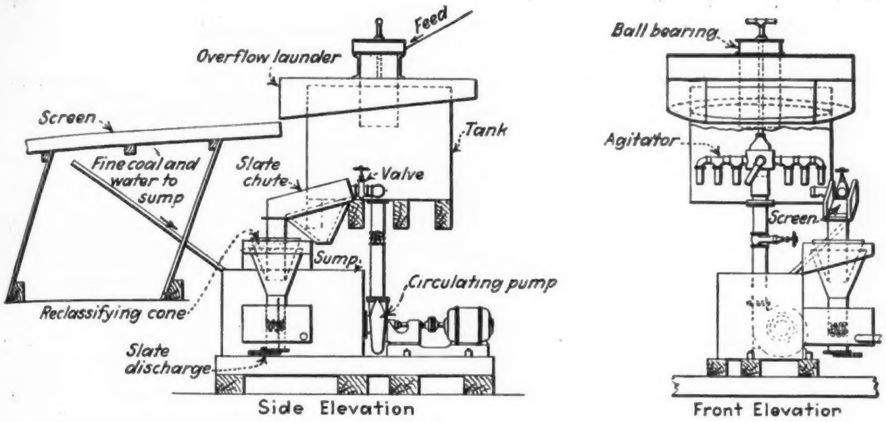


Fig. 2—Construction of the Hydrotator

of oversize makes for cleaner coal and the undersize makes the ash content higher where anthracite is considered, but that is not the case with bituminous. Any cleaning process involving upward current classification, therefore, will be more efficient in cleaning bituminous coal, not only because of the distribution of ash content in the sizes but because of the greater ratios between the specific gravities of coal and slate.

The Hydrotator process has so far been developed to clean anthracite from $\frac{5}{16}$ in. to dust and bituminous coal from 1 in. to dust. An improved form of the machine is shown in Fig. 2, which is based on that in the authors' paper. The coal is fed into a tank, usually 5 ft. in diameter and $4\frac{1}{2}$ ft. deep. The smaller machines are in proportion. The coal is discharged near the bottom and is carried to the top of the tank by the upward flowing current supplied by the agitators. The agitators are suspended from a ball bearing and revolve in the tank. The coal overflows into a launder and discharges onto a screen, the coal passing over to storage and the water and undersize flowing back to the sump.

The slate is discharged through a nozzle to a chute with a screen bottom which removes excess water. The water flows to the sump and the solids go to the reclassifying cone, where an upward current carries the coal to the top. It overflows into the sump while the heavier slate settles in the cone and is discharged at the bottom.

Uncontrollable circulating loads of solids, consisting of undersize material, is avoided by allowing only a portion of the material from the screens to return to the sump. Another means of elimination is by an overflow from the sump. The mesh of the screen usually is almost as large as the lower limit of size of the coal cleaned and performs the important function of returning the heaviest as well as some of the lighter undersize to the tank for cleaning. The main tank, being small, is somewhat sensitive to changes in the feed. Any change affects the product discharged to the reclassifying cone, which, however, is adjusted to return an excess of coal to the tank, compensating somewhat for fluctuations.

It has been found that the 5-ft. unit is best for average conditions and its capacity will vary from 25 to 70 tons per hour. As good cleaning is obtained at peak loads as at others. The barley installation was made at Candlemas Colliery of the Haddock Mining Co., Silver Brook, Pa., in September, 1928. Since October, 1928, it has successfully produced a shipped barley running less than 18 per cent ash. Data on performance are given in the accompanying tables, adapted from those of the authors.

The advantages outlined by the authors include simplicity of design, low upkeep, ease of operation with attendant low labor cost, low power consumption—between 0.1 and 0.2 hp. per ton-hour of clean coal production, not including handling and screening and high capacity.

The afternoon session on Thursday was presided over by W. H. Fulweiler, chemical engineer, United Gas Improvement Co., Philadelphia, Pa. D. H. McDougall, consulting engineer, Stellarton, N. S., in the absence of the author, Alexander L. Hay, assistant mining engineer, Dominion Coal Co., Glace Bay, N. S., presented a paper entitled "Description of Coal Mining Methods in the Sydney Coal Field." Those discussing the material presented included R. Dawson Hall, engineering editor, *Coal Age*, who presented information on the effect of expansion of mine roofs.

A paper, "The Design of Natural-Gas High-Pressure Pipe Lines," by Ralph E. Davis and Lyon F. Terry, New York City, was then read by Mr. Davis. The discussion was confined to problems of design brought out in the paper.

Spotting Faults in Explosives and Their Use

MISFIRE and premature detonation of explosives continue to constitute a great and ever menacing hazard in the mining industries. This was made clearly evident by what was said at the A.I.M.E. round-table discussion of the subject on Feb. 20, under the auspices of the mining methods committee, S. P. Howell, of the U. S. Bureau of Mines, presiding. Though this hazard is being gradually reduced, much remains to be done in developing safer methods and practices in the use of explosives. Stray currents are definitely attributed to be a cause of premature firing and no longer should be regarded as an inconsequential element of danger. It is generally agreed that mine officials must pay closer attention to study of, and education in, the use of explosives. In this work the manufacturer must take a hand and reflect the knowledge gained by improving certain of his products, as some of the blame is laid at his door.

The promulgation of dogmatic rules by agencies such as the U. S. Bureau of Mines is ill-advised, according to A. W. Worthington, assistant to the general manager of the Pittsburgh Limestone Co., Pittsburgh, Pa. In a paper on "Misfires in Open-Cut Operations" he maintains that while these rules may be applicable to particular operations they are inapplicable to others.

A paper on "Misfires in Bituminous Mining," by W. H. Forbes, safety engineer of the New England Fuel & Transportation Co., Grant Town, W. Va., was presented by Mr. Howell. When Tetryl No. 6 electric blasting caps were used in the New England company mines misfires did not occur, which is not true of the fulminate caps. This experience has

led the company to favor the Tetryl type. Mr. Forbes deplored the buying of explosives on price and urged comparative tests to determine the explosives and blasting caps best suited to particular needs.

FOLLOWING the reading of his paper on "Misfires in Anthracite Mining," which appears in abstract form elsewhere in these pages, Thomas D. Thomas, mine inspector of the Lehigh Coal & Navigation Co., declared he does not sanction the use of the Tetryl blasting cap on the sole basis that it will detonate insensitive explosives where other caps fail, arguing that the procedure would tend to divert attention from the direct problem of insensitivity. He has had three fatalities due to caps being placed crosswise in the hole.

Mr. Howell described how a certain company recovered and tested dynamite and caps from misfires. It was found that these caps would not fire samples of this same dynamite in the open at a separation distance of 3 ft., also that they would fire more sensitive dynamite under similar conditions at a greater distance. Mr. Worthington stated that there is little doubt that many misfires are due to insensitive explosives. His company will not knowingly use old or insensitive explosives.

Mr. Thomas included in his paper a complaint that the over-all resistance of blasting caps was not uniform and asked what variation was allowed by the manufacturer. H. H. Hamilton, of the Du Pont company, said that the allowable variation in resistance of leg and bridge wires in blasting caps of 1.5 ohms rated resistance is plus or minus 0.25 ohms. C. G. Hurter, of the same company, remarked that it is physically impossible to make all caps of one resistance. They are inspected for uniformity of resistance.

Richard Adgeton, safety engineer of the Tri-State Lead & Zinc Association, inquired if any tests have been conducted to determine the difference of electrical potential between various strata. Several premature detontions in the Michigan iron country and in the anthracite field are believed to have been instigated in this way, according to Mr. Hurder.

IN TESTING for stray currents, current as well as voltage should be read, stated Mr. Howell. Mr. Hurder explained that stray currents of small intensity are no indication that a danger does not lurk. The intensity of stray currents at one point may vary from time to time. This has been proved by the exploding of a blasting cap subsequent to the spotting of it at a point where stray current was barely detected.

Mr. Thomas is not in agreement with those who would dispense with the issuance of company rules in printed form. Put it all down in black and white, he cautions. State compensation boards hold companies strictly responsible for accidents not covered by rules. An employee of his company lost four fingers while tampering with a blasting cap, and from all indications it will lose the court case because the company rules did not cover details concerning the tampering.

Dan Harrington, U. S. Bureau of Mines, forwarded the opinion that blasting schools are the most important factor in the elimination of blasting accidents. B. Tillson, National Safety Council, described how one company trains its men in correct blasting methods outside the mine. A working place has been reproduced in the rescue station, where pipes have been arranged to serve as shotholes. Here the men are given individual instruction in correct methods.

Can Production Control Be Based On Past Trends?

Production control was the theme of the general meeting held Tuesday afternoon. George Otis Smith, president, A.I.M.E., presided. Carl Schneider, Federal Reserve Bank of New York, sketched business in general to prove his point that the main body of trade and production goes on with a stability far beyond that commonly thought. He suggested that production probably could be controlled by consideration of past trends. Walton H. Hamilton, Yale University, discussed the operation of the Sherman Act and its influence on mergers and combinations. He recommended, for the coal industry, an organization worked out from within itself, which would be managed by technical men and operated with the interests of the consumer, the owner and labor in view.

Oil production control based on the pool as a unit was outlined by J. A. Veasey, Carter Oil Co., Tulsa, Okla., in a paper entitled "May the American Petroleum Industry Through Voluntary Action Control Its Production?" Donnel F. Hewett, Bureau of Mines, in "Cycles in Metal Production," discussed European metal production over a number of years.

How to Stimulate Interest In Mining as a Career

Acquainting the public with the facts of the fuel situation as a means of stimulating interest in mining as a career was discussed by S. S. Wyer, consulting engineer, Columbus, Ohio, at the session on engineering education, Monday afternoon. E. A. Holbrook, Bureau of Mines, Washington, D. C., presided. "What an Operating Company Expects of the College Graduate" was then taken up by F. W. Bradley, president-elect, A.I.M.E., and L. E. Young, vice-president, Pittsburgh Coal Co. Mr. Bradley stated that the industry expected young men equipped with the fundamentals and Mr. Young emphasized the need of new blood brought on by mechanization.

Charles H. Fulton, director, Missouri School of Mines, and W. B. Plank, mining department, Lafayette College, presented views on "What the College Expects of the Operating Company in Receiving and Training Its Graduates." Professor Plank emphasized the causes of the drift from mining to other lines of endeavor. Concluding the meeting, Charles E. Lawall, School of Mines, West Virginia University, sketched the progress of mining education in the high schools at Gary and Berwind, W. Va.

The Great West

At Salt Lake City, March 11-13, the Rocky Mountain Coal Mining Institute and the local sections of the American Institute of Mining Engineers will meet in joint session to discuss safety practices and progress in mechanization.

And COAL AGE, which always has featured these deliberations of the Great West, will report the meeting fully in the April issue.

Investigation Uncovers MISFIRE CAUSES *In Anthracite Mines**

By *Thomas C. Thomas*
Mine Inspector
Lehigh Coal & Navigation Co.

IN 1922 one of the large anthracite producers decided to make a thorough investigation into the causes and remedies of misfiring and the problems involved were accordingly put up squarely to officials at the mines. Misfires were laid to two causes: (1) man causes at or in the mines and (2) manufacturers' causes. One of the outcomes of this investigation, which is being continued, is that all miners using large quantities of explosives detonated electrically have been thoroughly instructed in correct methods of blasting, and supervision of blasting has been tightened.

The manufacturers' representatives made certain recommendations and these were followed, among them the installation of galvanometers and larger firing lines. But misfires continued, making it apparent that the men in the mines were not entirely responsible for the failures. A request was then made that the manufacturers have their men conduct tests of their shotfiring equipment, including batteries and instantaneous and delay detonators. In these tests resistance of the shotfiring circuits was measured by the Wheatstone bridge.

Two different types of blasting caps and blasting machines were tested. In 34 tests it was proved that one of the two detonators was more positive and one of the two blasting machines more reliable. The manufacturer of the poorer detonator also offered another the resistance in the bridge wire of which was different from that on the first. When both these detonators were used in one series of shots misfires occurred. Here was a source of trouble attributable to the manufacturer and showed that it is wise practice to use only one type of detonator furnished by any one firm.

In multiple electrical shotfiring, which is the practice of the company that conducted the investigation, the important element is the bridge wire of the blasting cap. Any considerable variation in the resistance of the bridge wires, even with full or rated battery output, usually will cause misfires, as only those detonators that have the greater comparative resistance will fire. This variation is due to slight differences in the original diameter and composition or to rusting of the bridge wire.

Following the introduction of delay detonators complaints came from consumers of coal that detonators were being found in the coal. Investigation disclosed that whether the delay fuse was attached to the exploder in the mine by the miner or in the factory misfires occurred. It was found that one of two types of completely manufactured delay detonators tried gave practically no cause for complaint inherently, but that the second detonator did. In the inferior delay detonator waterproofing compound was found to seep through the cap and solidify above the fulminate of mercury, thus interrupting the passage of the spark from the fuse to the fulminate.

MISFIRES occasionally are found due to insensitiveness of permissible explosives coming direct from the factory. The writer feels that while he may not be fully aware of the difficulties attached to the making of explosives the purchaser should not be put in the position of exposing workers to the hazard thus incurred. That the manufacturer is sensible of this fault is evidenced by the introduction of a more powerful detonator.

Causes of misfires due to men at the mines are many. One fault is improper connections on leg and lead wires; frequently the connections are merely hooked. Another is the practice of hanging the lead wire by wrapping it around nails driven in the timbers, thereby inviting a ground. This practice has been eliminated by the use of a support made of scrap blocks of wood. Two $\frac{1}{8}$-in. diameter holes, through which the wire is threaded on being hung, are drilled in the block. A hole is drilled in the block, also, for the reception of a 10-lb. spike which is driven into a timber or a wooden plug in the rib.

When electrical shotfiring was first introduced 18-gage wire was used regardless of distance and the number of holes in a single round. Attempts to persuade the men that a larger wire would increase their safety and save their time and money at first were of little avail. Finally one of the miners was induced to buy a larger and rubber covered wire. The success which he met soon spread through the mines and resulted in all miners wanting this wire.

Another cause of misfires is improper care of the blasting machine, such as leaving it in the mine, where it collects moisture and dust, and prolonging its use, without repair, to the point where it fails to give the necessary output, in which case the miner will resort to the use of the trolley wire near at hand.

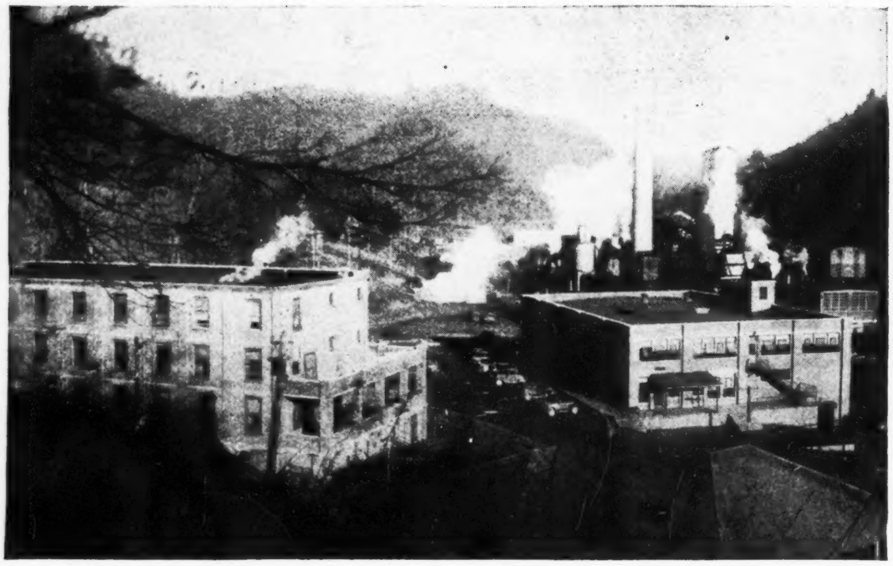
At many mines the workers are compelled after each shift to deposit their blasting machines in the assistant foreman's office, where they are dried out. A block of twelve 2.6-volt light bulbs is provided for testing the machines when their efficiency is in doubt. These tests are conducted by the assistant foreman in the presence of the machine owners.

MISFIRES are reported to the assistant foreman by the concerned miner. The foreman enters pertinent records of the misfires in a book provided for the purpose and has a safety board placed at the entrance to the chamber. This warning of danger must be heeded until the following day. He then notifies the fireboss, who examines the place during his morning inspection. In the event it is feared that the concerned miner is not reliable, a trusted miner is deputized to oversee the handling of the misfire according to regulations. The delay in handling a misfire is not governed by fear of hang fire so much as a desire to impress on the miner the necessity of care in arranging his shots.

Stray currents are a factor in electrical misfires, even in mines where no electrical equipment is installed or where all power has been cut off. Good bonding and adequate feeder and return cables will minimize this hazard. The miner invariably blames the manufacturer for misfires, but upon investigation the miner alone is responsible in nine cases out of ten.

*From a paper entitled "Misfires in Anthracite Mining," read at the A.I.M.E., Feb. 20.

Rolls . . . Gas . . . Bad Roof . . . *and* Heaving Floor



Clubhouse, New Office and Commissary Building; Topworks in Background

No Bar to Loading Machine

By J. H. Edwards

Associate Editor, Coal Age

THAT "the will to mechanize" and make mechanization succeed will overcome difficult conditions has been proved at the Glen Rogers mine, in Wyoming County, W. Va. This mine in November, 1926, seven months after the Old Ben Coal Corporation, of Chicago, took over its control and operation, installed its first Joy loading machine. Five more units followed during 1927 and another in 1928. Although they are working under conditions that are far from ideal each of the seven machines is producing an average of 175 tons per 9-hour shift.

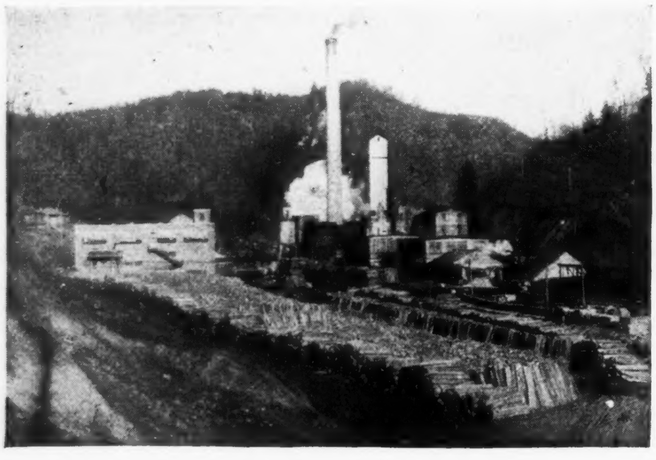
Operations are carried on under the name of the Raleigh-Wyoming Mining Co. Although the mine is in the Beckley seam and is only 15 miles southwest of Beckley, it is in a district by itself. It is served by a branch of the Virginian Ry. It produced 70,000 tons in October and 68,000 in Noember, 1928.

The thickness of the coal averages 6 ft., but the coal thins in places to 5½ ft. There is no regular parting or band of impurity in the seam. Rolls are encountered with grades that run up to 8 per cent. A high rate of methane effusion, a hard slate top which requires considerable timbering and a conglomerate or sandy shale bottom which heaves badly in certain sections are some of the natural difficulties.

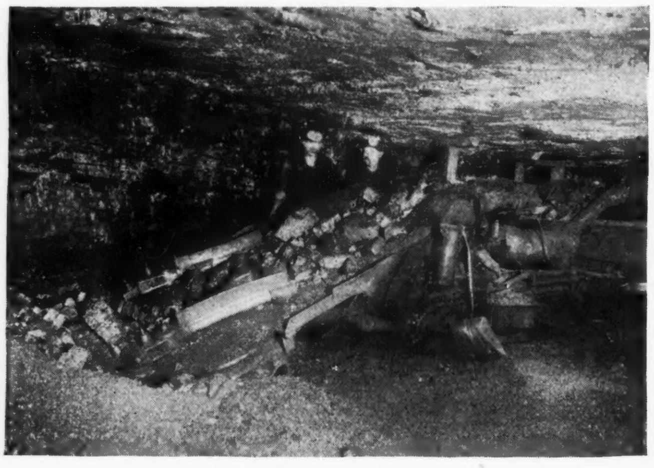
The cover is from 650 to 1,500 ft. Mining is by the panel system, and the pillars are robbed as soon as a panel is completed. All narrow work is driven 14 ft. wide and the rooms 20 ft. The latter are driven 250 ft. deep on 75-ft. centers.

All Joy machines are of the 5BU type. One is used solely for driving the four headings on a main entry,

Timber Supply for the Bad Weather



In Glen Rogers Mine



but the other six work both in rooms and headings. Pillar coal is center cut and loaded by hand. Approximately 85 per cent of the room and heading coal is machine-loaded.

Coal for three of the Joys is center cut by track-mounted machines. Working places for the other four loaders are undercut with shortwall machines and consequently in these places the bottom coal must be lifted by hand.

No special track arrangement has been provided for the haulage of the machine-loaded coal. The cars are loaded to an average of 3 tons and each machine is tended by a storage-battery locomotive. No trolley wire is hung in rooms or on room headings ventilated by return air and in but few places is any hung on room headings ventilated by intake air. On the mains, trolley wire is used only on the intakes, and when these are being advanced it is kept back of the last crosscut.

All mining machines, electric coal drills and loading machines are of the permissible type. The coal is shot with permissible explosive and without shearing or snubbing.

Production and delay records are kept for each loading machine. The normal intervals between car changes are not counted as delays. Machine breakdown is the chief cause of delay and mine-car shortage comes next. During November the average delay was 19 per cent.

In the first half of that month, consisting of 13 working days totaling 117 hours, the average accomplishment per loader per shift was 171 tons and the total delay per loader was 22 hours and 22 minutes, or 19.1 per cent. During the second half of the month, when the total working time was the same, the production per unit was 179 tons and the delay 22 hours and 11 minutes, or 18.9 per cent.

The crew for each Joy consists of ten day-rate men and a boss. The crew work includes gathering, cutting, drilling, timbering, track laying, bratticing and shotfiring.

Although closed lights and much permissible equipment are used, ventilation is rightly considered the all-important safety feature. A new fan has been installed which is handling 300,000 cu.ft. per minute against a 4.7-in. water gage. At the faces, line brattices are used exclusively instead of blowers and tubing.

The company has not only installed this fan but has made several other improvements. The main bottom has been practically rebuilt, using steel beams and concrete.

Fatality Results From Short Fuse and Metallic Pellet in Tamping

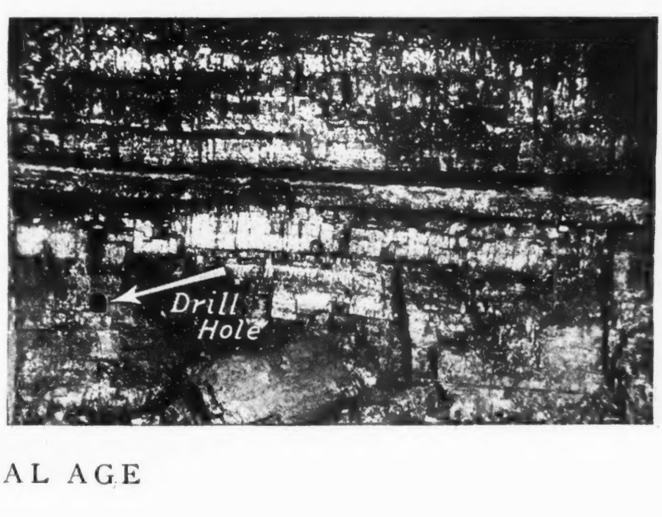
UNSAFE practices and the result are depicted in the following summary of a report of a mine fatality that occurred in Logan County, West Virginia. There was nothing unusual in the immediate cause, a short fuse, but at first it appeared the man had been shot with a gun.

The body was found 65 ft. from the face of a room where a center shot in a bottom bench of coal had just been fired. The only mark on the body was a small hole under the arm and penetrating a rib. In the victim's heart was found a metallic pellet $\frac{9}{16}$ in. in diameter and $\frac{11}{32}$ in. thick which in shape resembled a flattened bullet.

An attempt to scratch the pellet with a file disclosed that it was "as hard as glass," and upon further investigation it was decided that the material was a piece of iron slag. The victim had used "bug dust" and sand picked up from along the track as tamping material. Apparently the pellet was scooped up from along the track with this tamping.

Because the pellet entered the man's side and entered at a point normally protected by the arm it is supposed that he was running and swinging his arm and had just turned to enter a breakthrough.

The photograph of the coal face shows the result of the shot. In one lump is the drillhole from which the pellet must have been projected as if from the barrel of a gun.



Scene of Losing Race With a Short Fuse

Safeguarding of Equipment In Gassy Mines Discussed

European practice in the safeguarding of electrical equipment in gassy mines is discussed by L. C. Ilsley, electrical engineer, U. S. Bureau of Mines, in Bureau of Mines Circular No. 6082. Included in this circular is a part of the British "Coal Mines Act, 1911," together with comments on the provisions relating to the installation and use of electrical machinery and equipment in coal mines. In addition the testing of electric motors by the British Engineering Standards Association and the University of Sheffield and their inspection in the field by mine inspectors is described.

Mr. Ilsley contrasts British and American practice as follows: "There are a number of differences between the electrical installations in Great Britain and the United States. For instance, in British coal mines there are no trolley locomotives, whereas statistics compiled for 1924 give 11,986 in the United States. Every piece of apparatus and practically every conductor in British mines is earthed by carrying a ground conductor to a ground plate on the surface; practically no earthing is resorted to in American mines except to connect the frames of stationary motors to a pipe or rail return within the mine.

"Alternating current is not used extensively in American mines, but in British mines this prevails, and direct-current circuits are being replaced by a.-c. in a number of mines. The natural conditions in British mines as to grades, faults, thinness of seams, extreme depth of shafts and the difficulty of properly supporting the overburden rendered the installation of electrical equipment much more difficult than in American mines."

Alabama Presents Solid Front in

SAFETY CAMPAIGN

By W. B. Hillhouse
Chief State Mine Inspector, Alabama

ALABAMA is proud of the progress she is making in the conservation of life in coal mining. Her success is by no means attributable to sporadic drives but to everlasting vigilance, endeavor and determination that men shall mine coal in safety. That much abused word, co-operation, is the factor which has contributed most to Alabama's safety program. The State Mining Department is on its toes; the U. S. Bureau of Mines is active here as elsewhere; the operators and miners are helping each other and the two together are highly receptive to suggestions from without. Interest is heightened by the hearty support along educational lines of the Alabama Mining Institute and the many chapters of the Holmes Safety Association.

Fatal and non-fatal accidents have been dwindling consistently from year to year. In the twenty years prior to 1927 Alabama mined 341,817,873 tons of coal and killed one man for every 132,780 tons of production. These figures are furnished merely as a background of contrast for the records of 1927 and 1928. In 1927 fatalities totaled 93 for a production of 20,190,926 tons, or one fatality for 217,106 tons. In 1928 the fatality rate was 1 to 216,194 in the mining of 17,500,000 tons.

Greatest gratification results from the fact that no fatalities occurred from ignition of gas or dust in 1928. During the past year much progress was made in the extension of rock-dusting as a practice. Of the 230 mines being worked, 87 are gassy and 67 are rock-dusted. The electrical hazard is dominant and, though considerable progress was made in this direction in 1928, by shielding trolley wires on sidings and cross-overs, it is now being watched even more carefully. This hazard is of unusual degree in Alabama because many of the seams being worked are thin.

Much is being done in the way of safety through the adoption of electric cap lamps, many of the 5,500 lamps of this type now in use having been introduced in 1928. The prospects are that a substantial increase in the number of these lamps will be made during 1929.

The State Mine Department is staffed by nine inspectors. The Alabama mining law requires that each operating mine shall be inspected quarterly. Early in 1927 the state department initiated the plan of inspecting each of the 87 gassy mines once a month. This plan has not been allowed to interfere with the usual quarterly inspection of non-gassy mines. Results further justify the wisdom of this action, no fatalities from ignition of gas or dust occurring in 1928, as already related.

EARLY in 1927 a portable Orsat was added to the equipment used in making mine examinations. Its use naturally has enabled the inspection force to keep closer check on ventilation and the potential dangers of gas. With this information in hand constructive ventilation recommendations can be and are being made by the department. A volumeter also has been added to inspection equipment. It has enabled the inspectors the more readily and conveniently to measure the relative quantities of combustible and inert matter in mine dust. Again, the information thus gathered is made the basis of constructive recommendations.

State inspectors are assigned to certain districts, as is the custom in most other states. However, definite assignment is not strictly adhered to at all times, as experience shows that occasional shifting of inspectors gives a more uniformly thorough examination of all the mines. This improvement no doubt is brought about by the friendly and beneficial rivalry which the system sets up. No inspector relishes the finding by a fellow inspector who follows him in the examination of mine subnormal and dangerous conditions which probably existed at the time of his last inspection.

Joint inspection by state and coal-company officials are made at the instance of an inspector finding a condition or situation with which he is not entirely satisfied. Two or more state inspectors take part in these investigations. Regardless of the time required to make them, the department insists that all inspections be thorough, beginning with the tipple and extending to every feature above and below ground.

Semi-monthly meetings of the inspectors are held in the office of the chief inspector, and on these occasions each inspector reports in detail the unfavorable conditions existing at the mines he visited during the preceding two weeks. Individual and collective expressions brought out at these meetings have proved to be of much practical value.

IT IS to this thoroughness of inspection that much of the success in the functioning of the department is due. While the inspection forms filled out during a mine examination are complete as to vital details, the inspectors frequently submit with them letters correlating and analyzing the facts, which they summarize with recommendations. Note how clearly the case is stated and how definite are the recommendations in the following actual communication to me from two state inspectors, which is representative of these letters:

Pursuant to your instructions and accompanied by Inspector ———, an inspection relating to the ventilation conditions of ——— mine was made on Nov. 5 and report follows:

This mine is ventilated by means of a force fan. The system of ventilation is continuous. The fresh air enters the mine and travels through the right slope airway and such other passageways as may be open on the right side of slope. When the last entry on the right is reached the air begins its return by passing across the slope into the lower left workings, returning to the slope and thence to the surface.

Approximately 40,000 cu.ft. of air per minute enters the mine. Were air passageways unobstructed, doors and stoppings in good condition, a larger percentage of this would reach the lower working faces. As a matter of fact only 3,900 cu.ft. is passing in the 10th left, which is the last working entry over which the air current passes in the plan of ventilation.

A comparison of these figures indicates that of the total volume of air entering the mine, less than 10 per cent reaches the working faces. This deficiency is caused by one of two reasons, or perhaps both. These reasons are obstructed air passageways and bad conditioned doors and stoppings. If air passageways are obstructed and the doors and stoppings in fair condition, excessive pressure is had on these, resulting in excessive leakage. On the other hand, if the doors and stoppings are in bad condition and the air passageways clear but little benefit is had from the latter condition, due to the tendency of the air current to short-circuit when possible.

On the 4th right entry in this mine a single door is swung. During the movement of cars through this door the entire ventilating current is permitted to reach the

slope and at that point returns toward the surface.

Due to the excessive pressure on this door and on an overcast outby the door, a large leakage is very perceptible from this entry. This leakage will approximate 5,000 cu.ft. per minute. The same condition exists in the 5th right entry, where an opportunity was had to measure the leakage and this is 4,500 cu.ft. per minute.

Similar conditions exist in 21st, 22d and 23d rights excepting no pressure is had in these places because the air current so perceptible in the 4th and 5th entries has disappeared and such condition must be attributed to defective stoppings between the slope and slope airway extending from the 5th right to the 23d right.

The remedy for the short-circuit of air during the transit of cars through the door is the erection of a second door at a distance inby the first to allow ample room for the trip of cars to stand between. Were this done there would be no occasion for the short-circuiting, for the reason that only one of the doors would stand open as the cars passed through.

We recommend therefore that all stoppings between the slope and slope airway be given careful examination and where found defective be rebuilt and plastered with a mixture of clay and cement. We further recommend that all active entries on the right side of the slope have secondary doors as outlined above.

Please note air readings taken at the several entries in the lower workings together with results of atmosphere samples taken at the same points.

Where Taken	Cu.Ft. Per Min.	Methane, Per Cent
10th left airway 150 ft. from face	3,900	0.6
Inner crosscut in 12th left	1,920	1.0
Last up-set in slope	(No perceptible air movement)	0.6
11th left in inner crosscut	2,620	0.5
23rd right near face of entry	3,600	0.4

Since 0.5 per cent methane is recognized as the permissible amount of this gas in a mine atmosphere, it is evident that the above recommendations should have the careful consideration of the management of this mine.

The formal report calls for the following information and for such additional data and recommendations as the inspector may think pertinent.

STATE OF ALABAMA
MINE INSPECTION DEPARTMENT

Date of Inspection..................19......

1. Name of Mine.............................. County......................
2. Name of Operator....................P. O.............3. Kind of opening........
4. Name of Supt. ....P. O.....................................
5. Name of Mine Foreman..............P. O.............6. Certificate and class?...
7. Name of Fire Boss...................P. O.............8. Certificate?...........
9. Did you examine records of Mine-Foreman?.....................................
10. Did you examine records of Fire Boss?..
11. Are records properly made out and signed?....................................
12. (a) How ventilated.....................(b) Force or exhaust? ....
13. System of ventilation...................14. Has fan auxiliary drive?..........
15. Number of splits in air current..
16. Maximum number of employees in one split.....................................
17. Does the mine liberate explosive gas?.....18. Kind of lights used................
19. { Is the mine dry?...................20. Kind of explosives used............
    { Is the mine dusty?...................21. Kind of tamping used...............
22. What method of blasting; and when?......23. Kind of haulage...................
24. System of mining.........................25. Method of mining...................
26. No. of persons employed.......Miners.......Inside Men.......Outside Men.......
27. Voltage on electric wires in mine.........28. Are wires properly suspended?......
29. Does the Mine-Foreman or his Assistant visit working places each day?...........
30. Does Fire Boss make proper examination each day of all working places, and leave evidence of same?..
31. (a) Does Fire Boss make the necessary examination of abandoned or idle sections of the mine and leave evidence of same?........ (b) At what intervals are such examinations made? ....
32. What method is used for suppression of coal dust?..............................
33. (a) Is the mine rock-dusted?..........(b) If so, to what extent?................

AIR READINGS

Where Taken	*Cu.Ft. Per Min.*	*Methane, Per Cent*
....	....	....
....	....	....
....	....	....

Name of Mine ....
34. As to Tipple...
35. As to Scales...
36. As to Timber Supply..
37. As to First Aid Material...
38. As to Condition of Manway..
39. As to Safety Gates...
40. As to Ingress..
41. As to Egress...
42. Are the employees checked in and out of the mine?..............................
43. As to Signals..
44. As to Sign Boards..
45. As to Shelter Holes..
46. As to Doors..
47. As to Stoppings..
48. As to Breaks-through...
49. As to Drainage...
50. As to Ventilation and its Distribution to Working Face.........................
51. As to Timbering..
52. As to Pillar Work..
53. As to Powder Boxes...
54. As to Machinery and Appliances...
55. As to Dangerous Practices..

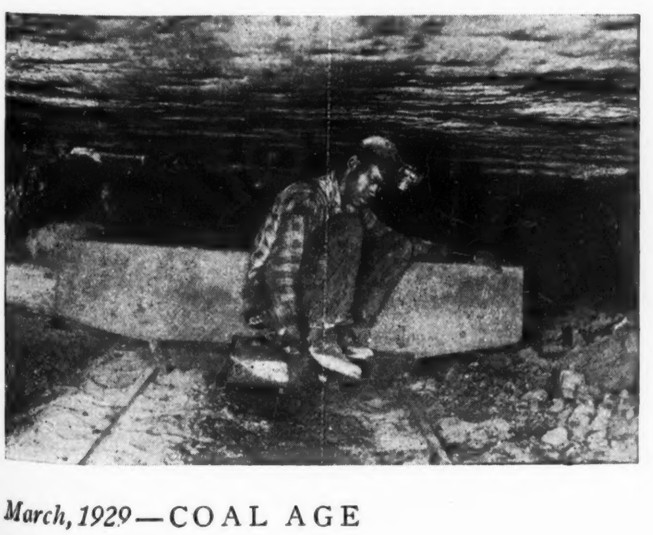
Photographs Tell Effective Story Of Dangerous Practices

STAGED photographs made in the exact location that a serious accident occurred are effective in impressing upon other workmen that the practice is dangerous.

Reproduced herewith are two photographs showing how a brakeman was killed because of riding on the front bumper of the forward car of a trip that was being "headed in" on a room entry. Apparently a jerk threw the man off in front of the moving cars. He should have been riding inside of the car.

These photographs were made in Logan County, West Virginia, at the instance of Archie Forbes, who is now safety director for the Logan County Coal Corporation and the Amherst Coal Co.

On the Bumper and the Trip Moving This Way



A Fall From the Bumper Left No Chance for Escape

Coal Age

Published by McGraw-Hill Publishing Company, Inc.

Sydney A. Hale, *Managing Editor*

New York, March, 1929

Danger ahead!

IN THE FACE OF a growing need for technically trained men, the mining profession is appealing less and less to the college student. A recent survey showed that only six per cent of the students enrolled in the engineering schools last year were interested in coal mining and that half of the graduates of the mining schools had drifted to other activities because of economic conditions or greater opportunities elsewhere.

Discussing the situation at the recent annual meeting of the American Institute of Mining and Metallurgical Engineers, Professor Plank of Lafayette College suggested two possible explanations. First there was the fact that many young men are influenced to take up coal mining as a profession by friends who have no knowledge of the industry, and actual contact later leads to disillusionment. Second was the feeling that many employers either do not use care in the selection of the men they draw from the schools or fail to give them opportunities to broaden. The sink-or-swim policy has lost many good men to the industry.

The question is one which must attract increasing attention. The testimony of the operating executives who are responsible for the modernization movement in mining all stresses the growing demand which that movement makes for technically trained men. As the situation now stands, however, anything approaching a sudden widespread call from the industry for new blood from the engineering schools could not be answered. Must a crisis actually develop before the industry awakens to the dangers ahead?

Evolution in ideas

TIME was when Europe declared that the roof failed always from shear. Then as the mines got under heavier cover and began to undermine houses and cultivated lands there were reports of rifts on the surface above unmined coal, and some even began to doubt whether there was any vertical shear. Some, however, developed an apocryphal theory of inclined shear, which is reasonable enough to predicate regarding a cliff or exposed face of rock or earth, but obviously is impossible with the mine roof, because to fall in the manner suggested it would have to wedge itself into a space too narrow for it.

Now comes Walter Herd with his story of bumps. He tells us nothing about openings above the coal and declares that for four years no subsidence has taken place in the monuments above the excavated area. Apparently the roof has subsided imperceptibly. The tension, it would seem, has been unable to make a crevice in the haunches of the tremendous stress arch which the mining of coal has created.

So once more there has been an advance. Because of our changed conditions we in this country were just beginning reluctantly to admit the existence of an occasional fracture over the pillar which we so long scouted. We still rightly insist that with narrow and shallow excavations, either or both, fracture over the pillar does not exist, but now we are forced to add that with very deep beds the surface tension is not sufficient to cause a surface break until an opening is made several times the depth. The tension per square inch in the exterior fibers of an unloaded beam is inversely proportional to its depth—a fact but rarely appreciated. For equal spans the roof and surface of deep mines are under less stress and are less likely to rupture than the roof and surface of shallow mines. Where there is less horizontal stress there is less horizontal shear, so the drawslate also should be less troublesome. Thus the roof in a mine 2,500 ft. deep should be 25 times as competent as the roof in a mine 100 ft. deep, other conditions being comparable.

A good start

A GOOD START toward the clarification of confused thinking on the subject of what is meant by cleaned coal was made at the informal discussion of that topic at the annual meeting of the American Institute of Mining and Metallurgical Engineers in New York City last month. If that discussion demonstrated any one thing it clearly established the necessity for arriving at some common basis of understanding between the producer and the consumer of coal. The proposal, therefore, that a committee be appointed to continue the work so informally launched is a step in the right direction.

General statements of consumer requirements in the way of quality and sizing have not been lacking in the past. Neither has there been a dearth of general statements covering what the mine had to offer. Ash content, B.t.u. and fusion points have been bandied about by both buyer and seller. But there has been too little correlation and co-ordination of viewpoints, too little attempt to fuse these viewpoints into a common understanding. The need for such understanding has been measurably increased by the new standards of cleaning and preparation which modern developments are bringing to the mines; the old yardsticks no longer give accurate measurements.

Once this common understanding of basic terms has been reached the field then will be open for the

consideration of the major question, which must be answered definitely if continued encouragement is to be given to improvement in preparation technique and practices. That question is: How much is this higher quality and more accurately sized or mixed coal worth to the consumer? That it is and should be worth more than a raw or indifferently prepared product is obvious. Unfortunately the incubus of a price complex still weighs down the industry and the consumer. The lifting of that incubus through education and proper appreciation of real fuel values is a task which the industry dare not shirk. The discussions which have been started present a logical approach to the successful accomplishment of this task.

Top and bottom

NOT SO LONG AGO an inquirer representing himself as a prospective home-owner called at a branch office of one of the largest anthracite companies and asked for information as to the respective merits of coal and oil in the domestic furnace. The spokesman for the coal company assured the inquirer that anthracite was the preferable fuel, but backed up this assurance neither with data orally delivered nor literature although he did say that he might be able to get some printed matter later.

The men at the top of the particular organization involved in this episode are among the most aggressive in the anthracite industry. The force of top-thinking, however, does not always seem to have made the impression it should on the lower strata. Unless the chief executives can sell their ideas to every subordinate the sharp drive from the top for more business or better products will be blunted at the bottom.

Pay by check

FOLLOWING the swing to open-shop operation of mines in the Appalachian fields, the practice has grown of issuing checks instead of cash to meet miners' wages. This departure is serving to acquaint the miners and their families with banking institutions and the men who run them.

In the old days miners, with few exceptions, spent their earnings on the day they received them for replenishing the family larder, for settling debts incurred during the preceding two weeks and for meeting installment payments due on luxuries. They gave little thought to the future and therefore failed to set aside a nest egg for the rainy day when mine operation would be curtailed. Given the opportunity, banking people in time will instill in them sound habits of thrift.

There is yet another reason why this more businesslike method should be employed by coal companies. It is the avoidance of payroll banditry such as was experienced by the Pittsburgh Terminal Coal Corporation several years ago. In all communities where banks are established wages should be paid by checks. Such a method of payment should be encouraged by workers themselves regardless of affiliation or non-affiliation with any labor organization.

Why not fertilizer?

A PROFITABLE use for coal might be in agriculture. Some who tried it in Pennsylvania, Colorado and Germany have declared that coal has value as a fertilizer. The agricultural chemists have ridiculed the idea because vegetation gets its carbon from the air, but perhaps a value exists in the inherent ash of the coal, that ash which formed part of the living plant organism and has not been leached in the progress of time. There may be left in it some readily assimilable elements or some elements that might be made readily assimilable by the use of agents such as lime. Moreover, coal makes clayey soil penetrable by plant tendrils and, being light, does not sink in the ground like sand. Screenings have been sold for that reason in the West.

Here is a possibility for research which can be made on any scale desired. One might plant a small area of wheat or oats in normal soil and some in soil treated with screenings of various sizes down to dust. Other plantings might be made in soil treated with lime or potash and screenings and others in soil in which all three are used. First of all, however, there should be an analysis to see what the soil contains. By measuring the product of the various plant areas it would be possible to prove whether the addition of coal was helpful as alleged.

Perchance too much has been taken for granted by agricultural specialists. They have condemned the use of coal without any attempt to test its value. Those, on the other hand, who have used coal as a fertilizer have been negligent about providing controls to prove the relative fertility of the treated and untreated land and as at least some of them lived in unfrequented areas, were little known men and had special conditions, their testimony was received with doubt as to its correctness and as to its breadth of application. The experiments made by agents of the operators for their benefit would convince them of the facts whatever they might be. The tests could be made in different kinds of soil.

Probably there are better fertilizers than coal, but the objection to all fertilizer is that it is expensive to transport. Coal might have a narrower range of salability than the recognized fertilizers have and the price might have to be such that only the cheaper coal, slack and boney bone could be sold. Still it would be well to find a use for these.

In any event the test is worth making and relatively inexpensive. In a year or two the industry would have the answer to a problem that has remained too long in doubt.

NOTES

From Across the Sea

GERMANY has developed a form of stripping different from ours and one which uses cars and locomotives and so is said not to have the same limitations as to depth of overburden as the casting stripping method that has been customary in the bituminous regions of this country. Where the stripped material is transported by cars it is possible, if need be, to take the overburden in two or more lifts, whereas where that is done with casting shovels the material in the upper lift must be handled twice. Moreover, the German devices without being immeasurably large can take as much as 82 ft. in a single lift with machinery already not only designed but operated.

Cars and locomotives are sources of loss of time and efficiency but with the new methods most of the difficulty, it is said, has been removed, for the material is dumped at about the level at which it is excavated and put back in many instances into the pit from which it was taken. Thus it is a method not unlike casting stripping, but nevertheless one in which the shovels will not be "land-locked" even in cases where the mineral is covered with a great depth of overburden.

The German equipment is what is known as a bucket scraper excavator or ladder dredge somewhat similar to those which have been loaded on barges and used on reclamation work, on irrigation and gold-dredging projects. The Germans term it an *eimerbagger*, which means a "bucket dredge." After all is considered, that is not an inexpressive name, for the word "dredge" is not necessarily associated with the sea or with water but with the action of drawing, and this equipment assuredly does drag or draw.

Machines of this land-dredge type remove not only the overburden but the coal also at all the many brown-coal mines of Germany. The output of the German brown-coal mines in 1927 was 150,806,000 net tons—almost half the entire output of the country—so it can be readily understood that this machinery has long since passed the experimental stage.

Fig. 1 shows a land dredge manufactured by the Lubecker Maschinenbau Gesellshaft, of Lubeck, Germany. This dredge runs on rails though many of them have been placed on caterpillars. Two tracks pass through the superstructure, and the material scooped up by the machine is delivered at either one of two points, one over each track. Thus the operation of the dredge is truly continuous, both as to excavating and loading. As soon as one train of cars is filled the material being scooped up by the buckets can be diverted to the cars in another train. The buckets of the dredge have a capacity of about 25 cu.ft., or almost a cubic yard, and they reach and excavate to a vertical depth of 82 ft. when the bucket ladder is inclined at an angle of about 50 deg. The capacity with buckets full and no delays is 1,000 cu.yd. per hour.

The excavator stands on 48 wheels, its weight being distributed by a patented three-point suspension. To counterbalance the weight of the bucket ladder a movable counterweight is provided which runs automatically up and down on a highly inclined curved track back of the excavator. By changing the angle of the bucket ladder the depth of the excavation can be regulated to suit the thickness of the overburden.

Another machine manufactured by the same concern is shown in Fig. 2. Here there is only a single track and the buckets have a capacity of about 0.4 cu.yd. When the top of the coal is level or has a regular gradient and the ground is irregular this form of machine has an advantage over the preceding. These machines are so arranged, however, that with trifling changes they can be converted to work upward or downward.

Another machine which weighs about 253 tons has been operating on three caterpillar trucks. It can be readily steered around curves and, like the track machines, will scrape either up or down the slope of the excavation. The buckets have a capacity of 0.4 cu.yd. and the capacity without delays, with full bucket loading and dischage, is about 650 cu.yd. per hour.

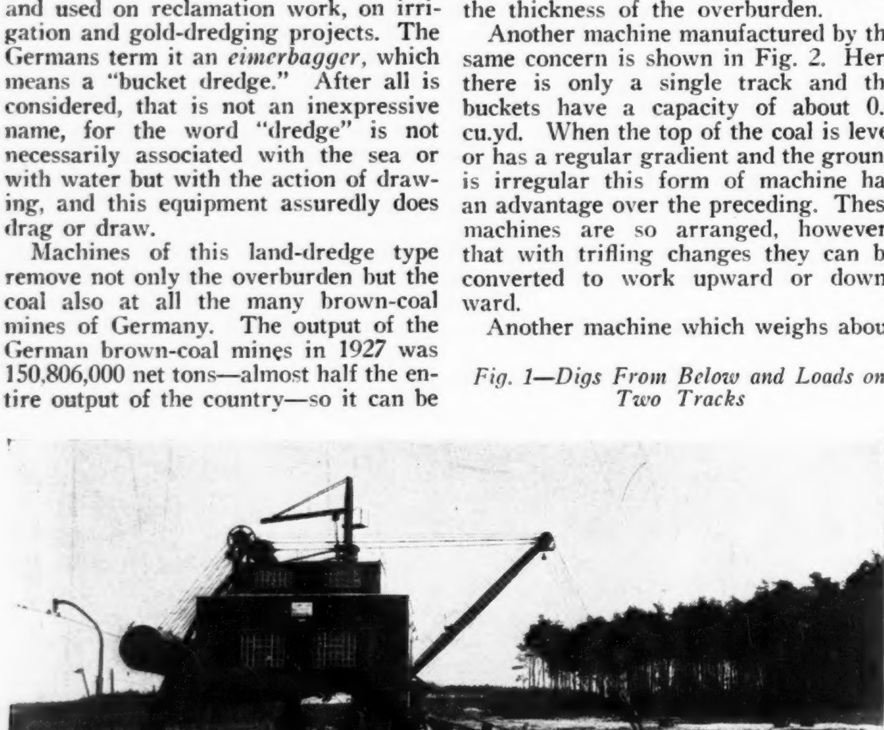


Fig. 1—Digs From Below and Loads on Two Tracks

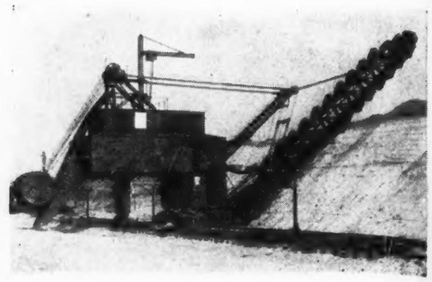


Fig. 2—Digs From Above and With Varying Overburden

Land dredges running on caterpillars are now being constructed with buckets of ½ cu.yd. capacity. These will excavate to a depth or from a height of about 55.8 ft., the working weight being about 462 net tons.

In cases where the excavator is placed on a berm of coal within the pit to scrape down and load the slopes of the overburden the excavated material might be dumped behind the excavator at such a distance as would make it possible to remove a swath of coal at the edge of the berm, thus eliminating cars and locomotives as with the stripping shovel. In this way continuity of conveyor work would be combined with elimination of train transportation.

Rail transportation of overburden has been objectionable because of the difficulty experienced in getting rid of the material dumped. Nothing seems easier than dumping and, indeed, nothing is easier if some one will remove the dumpings as fast as they arrive. It is not the discharge of earth that is difficult, it is the dressing of the dump after discharge and the problem presented by the sliding of dumped material.

Many have long realized that fact. Large 20-cu.yd. cars such as are used in Germany for this work and 30-cu.yd. cars such as are used here dump their spoil speedily, but it is absurd to say they dispose of the problem. Rapid and inexpensive track-shifting methods help and mechanical track shifters have been designed in America and Germany for that purpose. So also does the plow, or flanger, which restores the berm after the spoil has covered it. But with all that dumping is time-consuming and expensive work.

The Lubecker concern through its chief engineer, Mr. Uihlein, studying this matter with Mr. Branneke of the Braunkohlen und Briquet-Industrie Aktiengesellschaft, designed and constructed machines that pick up the dumped material and carry it out over the edge of the berm, dropping it where it can make no further trouble. It is termed in German an *eimerabsetzer*, or bucket disposer. Some have termed it

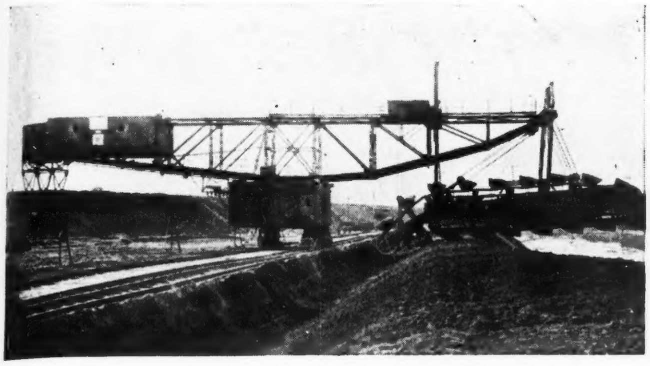


Fig. 3—Conveying Overburden From Receiving Trench to Point Well Beyond Edge of Dump

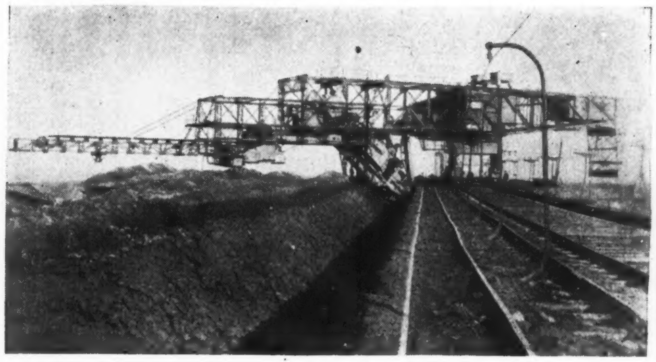


Fig. 4—Disposal Machine With Bucket Ladder and Conveyor Slewable 40 Deg. Either Way

a "refilling machine" because the German strip-pit operators like to take the material back to their strip pits so as to fill them up. Thus they save the purchase of dumping ground, shorten their hauls and restore the land to cultivation. A better name might be "spoil-disposal" or simply "disposal machines" because they are not necessarily used for the refilling of excavated areas nor do they in all cases have bucket conveyors. This name will be used hereafter.

Spoil-disposal machines have been designed which pick up their spoil and take it down a slight inclination or on a level to the edge of the fill. The road on which the cars arrive from the strip pit passes through an opening in the spoil-disposal machine so that the spoil can be dumped at the exact point desired. The conveyor used for the transport of the material to the edge of the dump may have either buckets or scrapers. The angle to the horizontal at which it works can be regulated at will. The use of the conveyor makes it possible to keep the cars, locomotive and the machine proper away from the perilous edge of the dump.

The system devised by Mr. Uihlein has great advantages in the speedy and efficient handling of material but there still remained the possibility that the bank might slide, and the German engineers proceeded to analyze just what caused such slidings and how best they could be prevented.

It was clear to the German engineers that soft material will not consolidate if it is gently rolled down a bank. They recognized also that it will form inclined layers of material parallel to the slope and that these layers will be in ideal condition for sliding down the bank. To these difficulties they gave their attention, with the result that they devised machines that either dump so far from the incline that they form a ridge either wholly or partly beyond the toe of the slope or deliver the material from shifting points so that the fill may be made in level layers. In either case the material is dropped from a height and well consolidated. The space between the ridge and the slope can be filled either in horizontal layers, which is the best way, or in inclined layers. As means may be provided for delivering the spoil onto a conveyor swung into a direction parallel with the track it is possible to fill it with inclined layers which would slide, if slide they should, parallel to the track and not at right angles to it—obviously a less harmful way of sliding.

These conveyors usually are of the rubber-belt type and in some cases have trippers which discharge the spoil at any point desired.

R Dawson Hall

On the ENGINEER'S BOOK SHELF

Low-Temperature Carbonization (or Distillation) Explained, by Murray Stuart; 56 pp.; 5½x8½ in.; Mining Publications, Ltd., Salisbury House, E. C. 2, London, England.

That those intending to invest in a low-temperature process for the carbonization of coal should be guided by the results achieved and the cost per ton of coal treated rather than the glowing promises of the promoter is the opinion of the author—an opinion that should hold universally. Carbonization is treated from the British standpoint, which relies on the process for oil and smokeless fuel. This, of course, is not the condition in the United States, but the economic reasons back of the choice of a process are as evident here as elsewhere.

The history of the process is taken up and the author states that, far from being "new," it was in use before 1850, or nine years before the first oil well was drilled. James Young was engaged from 1848 to 1851 in the refining of a natural petroleum at Alfreton, Derbyshire, and, after failure of this source of supply, patented and put in operation a low-temperature coal distillation plant at Bathgate, in Scotland. A thriving industry is chronicled, the author stating that 70 plants were in operation in the United States when the first oil well was drilled. The rising tide of oil submerged the industry, however, until the present day.

The gas or coke-oven industries need not fear the encroachment of the low-temperature process, according to the author, as low-temperature gas is very inferior in quality. He holds, however, that employment will be helped and the smoke nuisance reduced. In addition to the above material, a method of calculating the probable success of a process is offered and the various processes in use in England are listed and described.

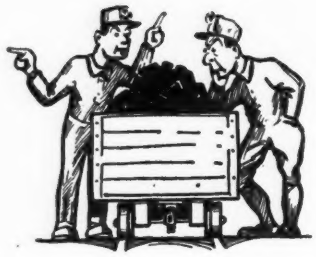
Finding and Stopping Waste in Modern Boiler Rooms; pp. 788; Cochrane Corporation, Philadelphia, Pa.; price $3.

In these days of super-salesmanship when the operator is expected to show his salesmen or have them shown the modern ways of burning and saving fuel so that they can inform their clients, this textbook may be found helpful, though it has perhaps too scientific a method of presentation, and salesmen might balk at a treatise so laboriously complete.

Every purchaser of coal and every boiler-house operative or engineer is prepared to explain the poor economy he is achieving by blaming the fuel. The salesman has no answer unless he has made the problem of combustion his own. Even if he cannot advise he at least can inspire confidence in his ability by knowledge and an intelligent recognition of good practice.

This publication, the third edition of a book that has had a wide circulation, covers fuels, combustion, heat absorption, boiler efficiency and testing, feedwater heating and conditions, and does it well. The statistics, however, are a little behind date and some might not accept the definitions of anthracite and semi-anthracite. Some of the data also that are subject to change are undated.

The BOSSES *Talk It Over*



Taking a Chance in Timbering

"HOW goes it, Mac?" asked Jim, the super, as the foreman entered the office one cold, blustery day and stamped his way to the inviting stove.

"O. K., Jim—except for one thing and you know what it is. I've been trying to take the Old Gent's view on the timbering question but it goes against my grain. You got to take a chance with the roof, eh—place props only under cracked rock, take a chance on shelly stretches until they show signs of breaking and do as little roof ripping as you can get by with? Humph! Not me. I'm thinking about the safety of yours truly and my men first, last and always."

"But, Mac," enjoined the super, "we're not in the business for our health. You have to take a chance there. No matter how carefully you timber you face the danger of roof falls. It's—"

"Let me do the talking," heatedly interrupted Mac. "I'm not out to run up costs. I don't put up timbers where they aren't necessary. You don't know the close-up of our roof conditions, neither does Dad. You got to learn their ways just as you do the ways of a person. Taking a chance is what kills men. I'm surprised at you, Jim; I'm surprised at the Old Gent for taking that stand. You held down my job once and so did he. It seems that when you get out of the mine you forget your responsibilities. Let's find some other way to cut down, and leave the timbering situation as it is. I stand on that; and if it don't go with you and the Old Gent I'm afraid I'll have to get me another job."

WHAT DO YOU THINK?

1. *Where should the line be drawn as between the placing and omitting of timbers?*

2. *What is your system of timbering?*

3. *Should timbering be left entirely to the judgment of the foreman?*

4. *Is Mac right in threatening to quit his job?*

All foremen, superintendents, electrical and mechanical men are urged to discuss these questions. Acceptable letters will be paid for

Mine Officials Discuss Influence of Ventilation On Productive Efficiency

Why Not Place Ventilation In Charge of Specialists?

AS A GENERAL rule the laws governing mine ventilation are a closed chapter to most mine managers. To be sure, their practical experience makes it almost impossible for them to fail on routine problems, but to pin them down to the fundamental laws controlling pressure, power and quantity finds them with much urgent business elsewhere. Eight out of ten won't even try to find out.

It has too long been taken for granted that coal mining cannot be classed as a profession because of its primitive nature. Modern concentrated coal mining, with its intricate machinery, enormous tonnage and extensive development, is too big a job for any one man to master. But a mine superintendent or manager is turned loose to master and control a dozen different technical phases of coal-mine development, which makes of what might be a harmonious unit a knockdown and drag-out affair.

Coal mining as a major industry requires its experts. And mine ventilation is the most important single item in coal-mine development. It is somewhat of a reflection on the intelligence of mine executives to have the ventilation of a mine laid out with minute completeness of high-priced engineers and leave the carrying out of the plans to those who barely understand the rudiments.

The ventilation of a mine should be planned well in advance, the system of working the coal determining the method. The longwall system may be passed by as presenting few problems in ventilation difficult to solve.

Elsewhere ventilation offers greater scope for intelligent handling of its problems. Defective crosscut stoppings are the cause of most of the ventilation difficulties. On primary entries crosscuts should be closed with airtight concrete-block stoppings. On secondary entries crosscuts should be closed with stoppings of shiplap board hitched in each rib and sealed with wood-fiber plaster. Entries not being used for haulage purposes should be center-posted in a substantial manner to hold the roof intact. It is well to put a sliding door in every fourth crosscut in main panels and stub entries to allow access to the back aircourses to repair the ravages of time.

No doors should be permitted on any main haulage roads. In the first crosscut on the main panel a wood partition should be built in the stopping and a water gage placed therein, between the intake and the return. This is a valuable aid in detecting obstructions in aircourses and saves time and expense in locating air chokes.

I believe the time is not far distant when all rooms will be driven to the limit—say, 250 ft.—without a crosscut, the air being carried to the working face by canvas tubes or some such temporary arrangement. Where a 50-ft. pillar is left between rooms, the recovery will be larger and less expensive. The mining law of my state requires a crosscut every 60 ft. between all entries and rooms, except where special permission is granted by the State Mine Department to test new methods of mining.

The saving in the power bill itself in the run of a year will more than pay the expense of a competent ventilation department. With these problems in the hands of a specialized department the expense of maintaining mine-rescue stations could be devoted to more humanitarian ends. ALEXANDER BENNETT.

Panama, Ill.

Let's Be Practical

If $10,000 spent in timbering would save two lives and $12,000 four lives, how much would you spend? Without exception all would decide on the greater expenditure. Yet in actual practice those comparatively few additional dollars which do the most good are cut from the budget. Forget, for the moment, the human side and consider the economics in terms of dollars. The answer: two thousand dollars saved in timbering, but several times as much payable for accident compensation. Is that being practical?

Mr. Mine Boss, why not use your pen in analyzing this situation. The industry wants to know what you think of it, so send us your thoughts.

Yardstick of Ventilation Is How Well, Not How Much

IT IS impossible to correctly judge the standard of ventilation by the supply of air generated by the fan, owing chiefly to air leakage. With a good ventilating plant which has a reserve of power the ventilation of a mine by separate splits is not a serious problem, especially if each split has not an extensive area to ventilate. When the workings become extensive, care and attention are required to keep the ventilation up to standard. The air must necessarily travel a more circuitous route, owing to which more leakages may be expected. Again, in addition to the working faces, very often extensive abandoned areas have to be kept ventilated, and this, coupled with the addition of the various splits and the more serious leakages, may lower the quantity of air passage in each split to a minimum.

In a case of this kind it would be advantageous to consider each split separately to determine which splits are not adequately ventilated and which have a surplus. In this way one split may be made to compensate another without unduly interfering with the ventilating arrangements. Adequate splitting should be resorted to, as when each section has its own intake and return a fall in one section will not materially affect another.

The maximum quantity of air which can be circulated around the working faces is largely determined by the permissible face velocity. If this velocity is too high it is uncomfortable for the men at the face and, therefore, is a source of inefficiency. Velocities should be high enough to break up smoke and other noxious gases and keep the atmosphere clear at all times. To allow the air to become sluggish tends to reduce the vitality of the men, thereby reducing the output and increasing the accident risk. The gases from explosives should be quickly removed, because these are injurious to the health of the workmen.

In a well-ventilated, non-gassy mine line brattice is not necessary. In the ventilation of deep rooms a check curtain on the entry and waste rock in the open breakthroughs will keep sufficient air at the face.

As few doors as possible should be used and these kept off main lines. Doors should be placed in crosscuts on entries instead of curtains or flies. A light portable two-way door built on the job, can be used at these points. It can be moved up as soon as the crosscut is abandoned and a permanent stopping built. A two-way door equipped with bumpers and a regular automatic door are the only ones that can be kept shut, as the ordinary slam door is kept standing open about as often as it is kept shut.

There is no excuse for mine air being below standard either in quantity or quality, with the devices we now have for measuring, sampling and analyzing.

In my opinion it is fallacious to base an opinion as to the adequacy of a ventilating current on the number of cubic feet per minute passing per man or on the quantity passing per ton of coal mined. Some mines are better ventilated with a current of air allowing 100 cu.ft. per man than others where the quantity is double or even treble that amount. WM. W. HUNTER.

Mt. Hope, W. Va.

Keep Ventilation in Step With Mine Development

IN MANY mines advanced a considerable distance from the opening lack of sufficient air at the face is the cause of much worry. Where this is so the probability is that consideration was not given to future problems of ventilation during the earlier years of mining. Falls of roof in the aircourses were merely leveled off; breakthroughs were stopped with lumber or waste rock and then forgotten. Then came the time when ventilation was found insufficient to meet the requirements set forth by state mining laws.

Investigation usually shows that the fan is putting more than enough air into the intake to take care of ventilation needs, but the air does not reach the working places where it is most needed. How to get the air to the working faces is the problem.

The mine officials begin figuring whether a booster fan or two would help any, but the idea is soon dropped owing to a multitude of objections to its use. They are up against it again and on further study hit upon the idea of sinking a new airshaft near the live workings. The plan is presented to the company, which rejects it on the ground that it is costly. There remains only one alternative: clean up the airways, repair all stoppings and seal off old workings. This in all probability is what should be done in the first place. Presto! The old fan is doing a good job again.

But the job is not yet completed, for while the air is carried in ample quantities to the working territory it has not yet been made to course individual working places. Trouble is experienced in keeping trap doors in good repair and it is decided to end it by constructing overcasts and splitting the air. Usually, in going over the old stoppings or brattices, some of them look good on first inspection but subsequently are found to leak badly due to rotting, if of wood, or to swelling bottom or spawled coal ribs. Where a stopping will serve a useful purpose for only a year or two it is quite all right to make it of lumber, but for greater permanency it should be constructed of brick or rock, tightly sealed. If all these things are done it will not be necessary to make wide use of line brattices except for the removal of gas feeders.

Yes, it does take a good deal of cash to do the things here outlined, but the expenditure will pay dividends. When the reconditioning job is done all at once the cost must, of course, be paid in a lump sum and cannot be spread out over a period of years as is the case when ventilation needs are met immediately upon their appearance and not put off to a future date. J. A. R.

Sullivan, Ind.

Laxity in Planning Causes Ventilation Difficulties

ADEQUATE ventilation will considerably increase the efficiency of the workman both in production and preparation of coal. A coal loader working in a polluted atmosphere is not as safe as one working in air free of impurities. From experience, I am of the opinion that Mac is driving his rooms too long to ventilate them properly without the use of curtains, brattices or mechanical ventilation. I suggest that where rooms are more than 300 or 400 ft. long he drive every fourth or fifth room through the barrier pillar to the adjacent parallel entry. This will relieve the situation without much affecting the cost of production. Otherwise it will be necessary to spend considerable money for the erection of stoppings, doors and curtains.

Any mining man who is lax in planning and maintaining his air distribution circuit as the mine develops is only bringing hardship on himself and the company for which he works. A sluggish air circuit will not remove from the mine all the accumulations of smoke and gases. By keeping the air circuits clean, by maintaining the proper sectional area together with ample velocity and by properly distributing well-constructed stoppings miners will not develop headaches while on duty, their efficiency will be increased and a major cause of explosions will be eliminated. C. T. GRIMM.

Adrian, W. Va.

Production Is Stepped Up By Improving Ventilation

LINE bratticing in rooms constitutes a good system and should be followed in all mines whether gaseous or not. In about every eighth room brattices should be put in all breakthroughs except the last and a curtain placed on the entry between the eight and ninth

Trade Literature

Skip Hoists. Stephens-Adamson Mfg. Co., Aurora, Ill. Selection of sizes, classifications, tabular data, capacity schedules are covered; the S-A style skip hoist machine also is described, as also are buckets, automatic loading devices, semi-automatic and full automatic controls and the determination of cable sizes.

A. C. Automatic Starters. Monitor Controller Co., Baltimore, Md. Bulletin No. 113. Construction, operation and advantages are described.

Enclosed Circuit Breakers, Type EAF (free handle). Roller-Smith Co., New York City. Supplement No. 1 to Bulletin No. 580. Describes new line of small, enclosed air break circuit breakers.

Electric Mine Hoists. Hardie-Tynes Mfg. Co., Birmingham, Ala. Describes the various types of hoists, safety features, etc. Bending stresses of hoist rope based on different strands also are given.

"Wherever Wheels and Shafts Turn" is the title of a 149-p. book, issued by the Timken Roller Bearing Co., Canton, Ohio. Describes and illustrates the various applications of Timken roller bearings.

United Iron Works Inc., Kansas City, Mo., has issued a four-page bulletin illustrating and describing its United longwall face conveyor.

The Hays Corporation, Michigan City, Ind., has issued catalog RA-29, and catalog AA-29, illustrating and describing its CO_2 and draft recorder and flue gas analyzers and portable combustion test sets, respectively.

Parker Tube Couplings for Power Plants. Parker Appliance Co., Cleveland, Ohio. Form No. 2-1029.

Morse Chain Co., Ithaca, N. Y., has issued Bulletin No. 35, covering stock sprockets and chains.

Recent Patents

Low-Temperature Distillation of Bituminous Coal; 1,698,907. Richard H. Carr and C. B. Watson, Columbus, Ohio, assignors to the Pure Oil Co., Chicago, Ill. Jan. 15, 1929. Filed April 15, 1926; serial No. 102,332.

System of Mining; 1,699,098. Walter M. Dake and R. A. Walter, Washington, D. C., assignors of one-fifth to Harry H. Semmes, Washington, D. C., Jan. 15, 1929. Filed Aug. 16, 1923; serial No. 657,714.

Process for Obtaining Hydrogenation Gas for Hydrogenating Carbon and Hydrocarbons from Gases Containing Methane and Hydrogen; 1,699,177. Friedrich Bergius, Heidelberg, Germany. Jan. 15, 1929. Filed Nov. 30, 1925; serial No. 72,414.

Scraper Attachment for Chain Belts; 1,699,334. John H. D. Peterson, Chicago, Ill., assignor to Link-Belt Co., Chicago, Ill. Jan. 15, 1929. Filed Sept. 7, 1926; serial No. 133,880.

Tripping Device for the Bucket Door of Power Shovels; 1,699,371. H. L. Mitchell, Milwaukee, Wis., assignor to the Harnischfeger Corporation, Milwaukee, Wis. Jan. 15, 1929. Filed Nov. 2, 1925; serial No. 66,195.

Process and Apparatus for Making Coke; 1,699,448. Franz Puening, Aspinwall, Pa. Jan. 15, 1929. Filed May 29, 1922; serial No. 564,377.

Mine Car; 1,699,535. W. V. Johnson and Robert C. Kepner, Bloomsburg, Pa., assignors to American Car & Foundry Co., New York City. Jan. 22, 1929. Filed Dec. 23, 1924; serial No. 757,659.

Plant for Washing Coal and Other Minerals by Means of Liquid Streams; 1,699,962. Antoine France, Liége, Belgium. Jan. 22, 1929. Filed Nov. 27, 1926; serial No. 151,123.

Coal Breaking Machine; 1,700,266. Amable Lozai and Achille Lerciu, Petite Guevilly, France. Jan. 29, 1929. Filed June 1, 1926; serial No. 113,034.

Loading Machine; 1,700,294. Nils D. Levin, Columbus, Ohio, assignor to Jeffrey Mfg. Co., Columbus, Ohio. Jan. 29, 1929. Filed July 21, 1921; serial No. 486,651. Renewed Jan. 5, 1927.

Purification System for Boilers; 1,700,715. Julius Ostertag, Stuttgart, Germany. Jan. 29, 1929. Filed July 7, 1922; serial No. 573,415.

Vibrating Screen; 1,700,868. Herbert S. Woodward, Carbondale, Pa. Feb. 5, 1929. Filed Oct. 28, 1925; serial No. 65,287.

Automatic Mine-Car Stop; 1,701,040. Seldon Jennings, Providence, Ky. Feb. 5, 1929. Filed June 19, 1926; serial No. 117,121.

Coal Jig; 1,701,155. M. S. Hachita, Wilkes-Barre, Pa. Feb. 5, 1929. Filed May 14, 1925; serial No. 30,161.

Coal Washing and Selecting Apparatus; 1,701,589. C. Nakatsu, Kumamoto-Shi, Japan. Feb. 12, 1929. Filed March 1, 1926; serial No. 91539.

Coal Conveyor; 1,701,733. Arthur L. Shaw, Chicago, Ill., assignor to Chicago Automatic Conveyor Co., Chicago, Ill. Feb. 12, 1929. Filed April 27, 1927; serial No. 186,858.

rooms. This will deflect the air up No. 8 room and boost the ventilating current sweeping the working place.

No other expenditure can be made about the mine that will yield so large a return as that which is judiciously expended on ventilation. Not only should the equipment be of ample capacity and power but the control of the ventilation current should have the careful and constant attention of the person in charge of the mine.

Mine ventilation has another and important relation to the operation of the mine, aside from that of keeping the mine in a healthful condition for the men. It is the relation it bears to production. Unless it is properly controlled with brattices, stopping, doors and curtains, the ventilation of the mine will be insufficient, and the results obtained from the men will be greatly reduced. When the ventilation is poor, men will do less work, they will tire more quickly, feel languid and drowsy and take less interest in their work. Often on sitting down for a moment's rest they fall asleep.

With a good supply of wholesome air, however, quite the contrary is true. The men feel invigorated, energetic and have greater endurance. They take more interest in their work and are better contented. The result is they work more efficiently and produce more coal. This is altogether aside from increased safety which good ventilation engenders.

Doors should be constructed and fitted with great care in order that the loss of air may be reduced to the smallest possible degree. It is practically impossible to construct a door that does not leak, even when the greatest of care is taken. In order to obtain the best results, doors that control the main air current should be in duplicate, placed a sufficient distance apart to accommodate the longest trip, so that only one door need be open at any time. A much better and more efficient plan is to split the air of the mine and do away with doors, especially on the main airway.

C. A. PEAKE,
Kermit, W. Va. Mine Foreman.

Close Room Crosscuts to Get Plenty of Fresh Air at Face

I HAVE had satisfactory results in the ventilation of a non-gassy mine with a minimum of 12,000 cu.ft. of air per minute in any entry by adhering to the following practices: Put a canvas across the last breakthrough in the entry and run a line brattice up to the face. Take the air up the narrow side and back on the wide side. Don't hang the curtain tight across the breakthrough as otherwise you will "choke" the main current. It may be advisable to put up a light door across the entry, just outby the last breakthrough, instead of hanging a canvas in that breakthrough, in which case the door should not extend entirely across the entry. It should reach only to the brattice line and thus provide an open channel for the passage of air to the face.

Where no gas is present I have never found it necessary to run a line brattice in a room. I place a light two-way door on the entry between the first two rooms connected by breakthroughs, also between the last two rooms. In addition I hang canvas in all breakthroughs but the last in rooms. I have heard miners say they like doing a day's work and are less tired at night when they work in fresh air. Of course they do. A. A. ALLAN.
Brownsville, Pa.

Publications Received

The Carbonization of Ohio Coals, by D. J. Demorest. Engineering Experiment Station, Ohio State University, Columbus, Ohio. Price, $1. Bulletin No. 46.

Annual Report of Mineral Production of Canada during Calendar Year 1926. Dominion Bureau of Statistics, Mining, Metallurgical and Chemical Branch, Ottawa, Canada. Price, 50c.

Investigation of Warm-Air Furnaces and Heating Systems. Part III, by A. C. Willard A. P. Kratz and V. S. Day. Engineering Experiment Station, University of Illinois, Urbana, Ill. Bulletin No. 188. Price 45c.

Topographic and Geologic Atlas of Pennsylvania No. 27 Pittsburgh Quadrangle by Meredith E. Johnson. Pennsylvania Geological Survey, Fourth Series. Price, $1.

Annual Report of the Director of the U. S. Geological Survey for fiscal year ended June 30, 1928.

Proceedings of the 31st Annual Meeting of the American Society for Testing Materials at Atlantic City N. J., June 25-29, 1928.

Report on an Investigation at Mines Department Testing Station, Sheffield, England, on the Safety of Certified Mine Signalling Bells When Connected in Parallel, by Capt. C. B. Platt and Dr. R. A. Bailey. Price 6d. net. H. M. Stationery Office, Adastral House, Kingsway, W.C.2, London, England.

Safety Code—Third Report of Safety Committee of the Rocky Mountain Coal Mining Institute, with revisions adopted at the summer meeting, August, 1928.

Coal Mine Fatalities in the United States, 1927, by Wm. W. Adams. Bureau of Mines, Washington, D. C. Bulletin 293. Pp. 120.

Firedamp Exposions Within Closed Vessels—Pressure Piling, by C. S. W. Grice and R. V. Wheeler. Safety in Mines Research Board. Paper No. 49. Price, 1s. net. H. M. Stationery Office, Adastral House, Kingsway, W.C.2, London, England.

The Placing of Drill Holes in Coal Mining—Its Bearing on the Production of Lump Coal, by George S. Brown. Explosive Service Bulletin of E. I. duPont de Nemours & Co., Inc., Wilmington, Del.

The Pumpkin Buttes Coal Field of Wyoming, by C. H. Wegemann, R. W. Howell and C. E. Dobbin. Bulletin 806-A. U. S. Geological Survey, Washington, D. C. (Contributions to economic geology, 1928, Part II). Price, 10c.

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Things That Must Be Done For Efficient Transmission

AN EFFICIENT distribution system will reduce mine costs considerably, as practically all machinery in a coal mine is electrically driven. This machinery is designed for a certain voltage and amperage and obviously functions properly only when sufficient transmission facilities are provided. The wires, therefore, should be large enough to carry a current somewhat in excess of peak loads. Feeder lines should be provided where the power is carried any great distance from the substation.

Attention to the return is equally important. Usually the track rails have sufficient electrical capacity for the return, but as the rails are short, a good bonding system is required. Heavy hauls, falls of slate and wrecks of rolling stock compel frequent inspections of the bonding at regular intervals. I believe the welded bond is best. Care should be taken to make the welded contact with the rail large enough for the electrical duty imposed upon it. Where the duty is heavy, both track rails should be bonded and tied together by crossbonds at intervals of 125 ft.

Wheelwright, Ky. H. T. WALTON.

Impure Air Wipes Out Profits

JIM is quite right when he says it will cost something to hang curtains and install brattices to circulate the air through the working places. Mac surely knows it cost money to sink the shaft, build the tipple and install machinery before ever a ton of coal was produced. He must produce coal to meet the costs—the more the better, up to a certain point.

The tons lost due to men not being able to work are the ones that should contribute to profits. It is inhuman to expect men to work in atmospheres devoid of oxygen and polluted with gases. If the operators do not remedy these conditions voluntarily, action will be forced by laws that cannot be as easily evaded as those now in effect.

I suggest that in every room flanked by solid coal on one side all breakthroughs but the last one in the broken pillar on the opposite side be closed, and that a curtain or light door be placed on the entry to shunt the air into the room. In panels of rooms not having a blind side a line of brattices should be placed in the breakthroughs between pairs of rooms at stated intervals—say, between rooms Nos. 1 and 2 and then between rooms Nos. 10 and 11. In this case also it is necessary to place a door across the entry between the two rooms comprising a pair.

Linton, Ind. W. H. LUXTON.

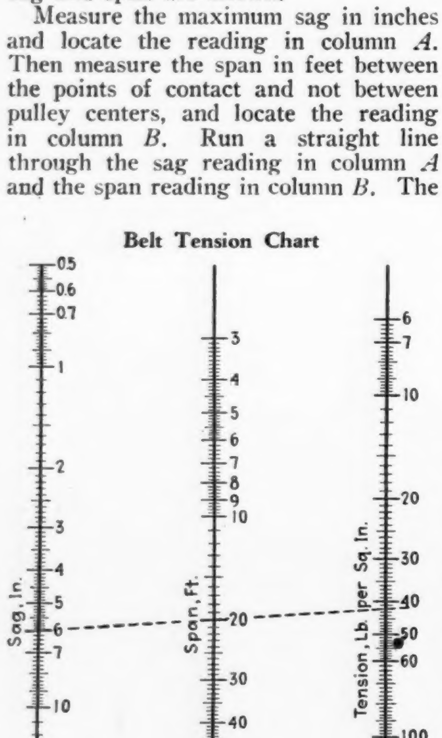
OPERATING IDEAS *from* Production, Electrical *and* Mechanical Men

Simple Calculations of Tension and Power Transmitted by Belt

EVERY mechanical and electrical man knows that all horizontal-drive belts sag, no matter how little or great the load imposed on them, and that this sag occurs in the tight side as well as in the slack side of the belt. Sag cannot be eliminated without external support and transmission belts are seldom supported. Appreciation of these facts by W. F. Schaphorst, mechanical engineer, Newark, N. J., led him to produce the accompanying chart for computing tension in any horizontal drive when the sag and span are known.

Measure the maximum sag in inches and locate the reading in column *A*. Then measure the span in feet between the points of contact and not between pulley centers, and locate the reading in column *B*. Run a straight line through the sag reading in column *A* and the span reading in column *B*. The intersection of this line with column *C* will give the tension in the belt in pounds per square inch. For example, if the sag is 6 in. and the span 20 ft., the tension as shown by the dotted line drawn across the chart is 42 lb. per square inch.

Belt Tension Chart



If both pulleys are of equal diameter and in a horizontal drive, the sag would be measured at the exact center of the span. If the drive is not horizontal and if one pulley is larger than the other, the results obtained by the use of this chart will be only approximate, but they will be close enough for ordinary purposes. The merit of this chart is that it is applicable to the tight side of the belt as well as the slack side, an advantage which makes it useful in computing the power transmitted by the drive. Knowing the two tension values, the width and thickness of the belt, the outside diameter and the r.p.m. of one of the pulleys, it is a simple matter to compute the horsepower transmitted, as follows:

Subtract slack tension from tight tension as taken from column *C* in chart, multiply by width of belt (in inches), multiply by thickness of belt (in inches), multiply by outside diameter of one of the pulleys (in inches), multiply by r.p.m. of that same pulley and finally multiply by 0.000007933.

To determine the tension of the belt in pounds per square inch without using the chart the following rule applies:

Square the span (in feet); divide by 8; divide by sag (in feet); then multiply by weight (in pounds) of the belting material in a piece 1 ft. long by 1 sq.in. in section.

Oak tanned leather belting, on which this chart is based, in a piece 1 ft. long by 1 sq.in. in section, weighs 0.42 lb.; mineral tan leather belting, 0.36; rubber belting, 0.54, and hair belting, 0.42. Canvas belting varies from 0.312 to 0.6 lb.

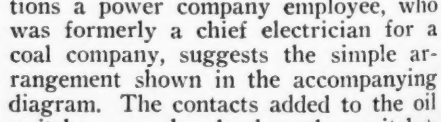
Connection Change Safeguards Two-Unit Substation

WHEN two converters or motor generators located in the same substation are operated in parallel, accidental opening of the oil circuit breaker feeding one machine endangers that machine because of its tendency to overspeed as a result of receiving power through the d.-c. end from the other machine. This condition also endangers the machine left in operation, because the increased load will cause overheating and yet not be sufficient to open the overload circuit breakers.

A properly maintained installation of overspeed devices, reverse-current relays and time-element overload trips will take care of the condition. However, some mine substations are not equipped with these devices and in many instances where they are so equipped they are not maintained in an operative condition.

As a safeguard against such conditions a power company employee, who was formerly a chief electrician for a coal company, suggests the simple arrangement shown in the accompanying diagram. The contacts added to the oil switches are closed when the switches are closed. The contact on one switch is in series with the undervoltage release coil of the other switch, so that if either oil switch opens the action will break the undervoltage release circuit of the other switch and cause it to open.

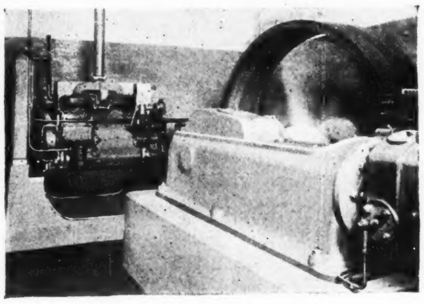
Control Wiring for Auxiliary Switches



In order to energize the undervoltage release of the first machine to be started after a complete shutdown, the small double-pole single-throw switch on the front of the panel must be closed. If but one unit is to be operated this switch is left closed, but if both units are put into operation this switch must be opened to afford the desired protection. Closing this knife switch short-circuits the auxiliary contacts of the oil switches.

Air Compressor Driven By Diesel Engine

An interesting application of Diesel power is shown by the accompanying illustration. It consists of a two-stage 16x10x14-in. air compressor of the horizontal type, driven by a four-cylinder Buda-M.A.N. Diesel engine of 6-in. bore and 8-in. stroke operating at 950 r.p.m. A twin disk clutch is inclosed in a housing bolted directly to the flywheel inclosure, and the engine is connected to



Does Unusual Duty

the compressor by means of a short belt and idler pulley.

The compressor delivers 400 cu.ft. of air per minute against a pressure of 130 lb. per square inch, and the air is used to operate Harris air-lift pumps in a deep well, raising the water from a depth of approximately 167 ft. and delivering it to a storage tank. The engine is the full Diesel type, with a normal operating speed of 1,000 r.p.m. and rated at 92 hp. at that speed. The actual brake-horsepower load varies from 80 to 87 hp.

This engine was installed several months ago for the purpose of observation and test, and is operated by the regular power-house attendants. The only attention required is limited to a brief visit of the engineer several times a day and the replenishing of fuel and lubricating oil at stated intervals.

The *Very* Idea—

Just the one you needed—to hurdle an annoying obstacle to smooth operation—may be in these pages. Or the answer to another's baffling problem may be in the bright idea that occurred to you. Send it in, with sketch or photograph if possible, and receive $5 or more. New mechanical kinks, electrical problems and short cuts bring better results.

Warehouse Cardcases Are Mounted on Turntable

Use of the Kardex system for keeping perpetual inventory of stock in a warehouse carrying a wide variety of supplies involves the problem of arranging the cardcases so that they are handy to reach without getting up from the chair and preferably without even swinging around.

The accompanying photograph shows the arrangement in the central warehouse of the New River Co., at Macdonald, W. Va. A home-made rotary stand holds eight cases which have a total capacity of 9,600 cards. Ball bearings are used in the turntable flanges and the weight is balanced so that the stand will turn at the touch of a hand. A clerk sitting at the narrow desk has easy access to any of the cards. Of the total capacity, approximately 7,500 cards are in use.

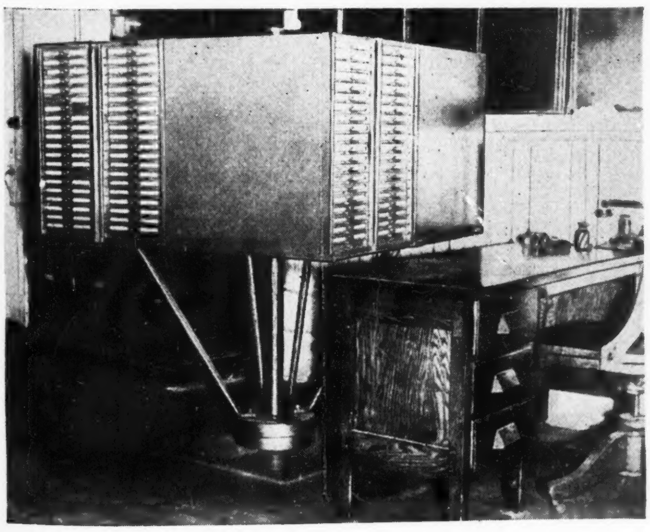
The warehouse serves the fourteen active mines of the New River Co. It is a brick and steel structure 100x220 ft. Eighty feet at one end is used for commissary supplies and the remaining 140 ft. for mine supplies. The rotary stand is used in the office of the mine supply department.

Electric Motor Windings Dried by Current

If a motor has become wet from any cause whatever, it should be dried out thoroughly before being operated again, according to C. W. Falls, industrial engineering department, General Electric Co. The most effective method is to pass current through the windings, using a voltage low enough to be safe for the winding in its moist condition. For 2,200-volt motors 220 volts usually is satisfactory for circulating this drying-out current. Thermometers should be placed on the windings to see that they are being heated uniformly. Temperatures should not exceed 90 deg. C. (Class A insulation). Applying the heat internally in this manner drives out all moisture and is particularly effective on high-voltage motors, where the insulation is comparatively thick.

Heat may be applied externally by placing heating units around or in the machine, covering the whole with canvas or other material and leaving a hole at the top to permit the escape of moisture. In doing this it is essential that there be a circulation of warm air over all the surfaces to be dried. The

All Cards Reached From Across the Narrow Desk



The Cards List Over 7,000 Items Stored in This Room

air should be allowed to escape as soon as it has absorbed moisture. Therefore the heaters should be so placed and baffles so arranged as to get a natural draft, or small fans may be used to force circulation.

Twelve-inch fans set to blow air across the fronts of "glow heaters" and then into the lower part of a machine from opposite sides, and so on up around the windings and out the top, will produce surprising results. The temperature of the winding should not be allowed to exceed 100 deg. C. for Class A insulated motors. Smaller machines may conveniently be placed in ovens, the same temperature limits being observed.

Attachment Makes Bander Of Winding Stand

Many discarded lathes are utilized as armature banding machines and in some instances there is applied an individual motor drive through worm gearing. This makes a good banding machine but in a small shop the work can be done economically and satisfactorily by hand if the proper arrangements are made for this method.

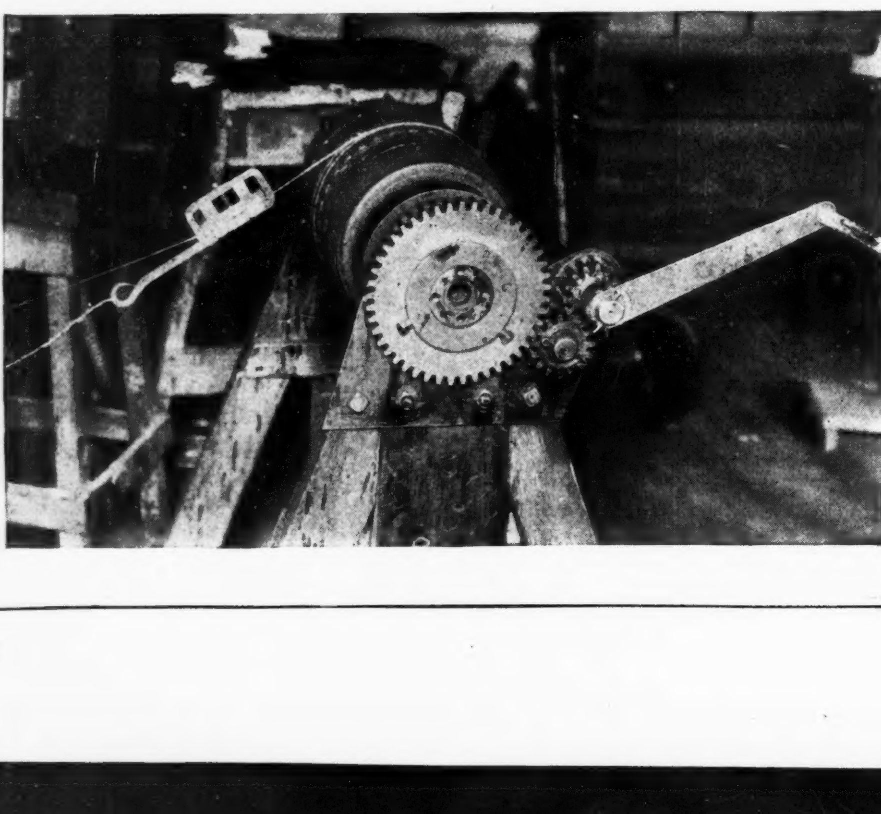
In the electrical repair shop of the Stearns Coal & Lumber Co., Stearns, Ky., B. P. Bass, chief electrician, has provided the hand-power banding machine shown in the accompanying photograph.

It is an attachment to an adjustable wooden stand which is bolted to the floor. All that remains on the winding stand when it is being used for winding is the steel side plate and the two gear axles or studs which the former supports.

The bore of the main gear has a diameter greater than the shaft of the largest armature. Bushings are provided for fitting the gear to the shafts of the various armatures used around the company's operations. The bushings are held by setscrews. The crank is attached permanently to one of the detachable pinions.

The wire clamp, also shown in the photograph, is of a lighter and more trim construction than the ordinary. It consists of a welded light steel frame in which small pieces of fiber clamp the wire by setscrew adjustment.

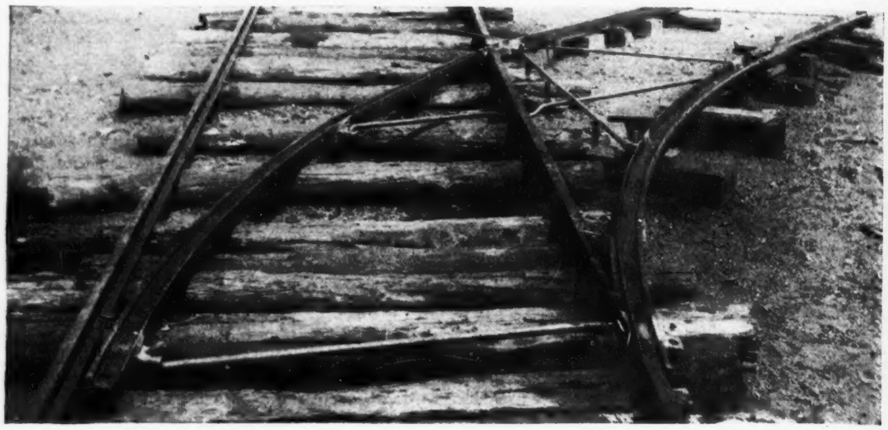
Winding Stand Converted Temporarily Into a Banding Device



Laying of Extension Rails Made Easy

The use of extension rails, temporary rails or "jumpers" usually results in the problem of securely fastening them. Two new inventions by J. E. Wilson, Eldorado, Ill., are designed to solve this problem. The first is known as the slide rail "cuff," or "holder," and is a pair of couplings or sleeves shaped to conform to the rail sections. They support the ends of the rails, which lie on their sides. A connecting rod is provided between the two sleeves to keep the rails to gage.

The slide rail "turn," the second of the inventions, consists of a pair of surface bent rails which are coupled to the end of permanent track by the cuffs. Half way between the ends of each rail is a pair of ears. When the rails are in place two tierods fit into these cars and hold the turn in position. A turn can be laid in eight minutes, according to the inventor, and the "turn" and "cuffs" are easily handled or transported from place to place.

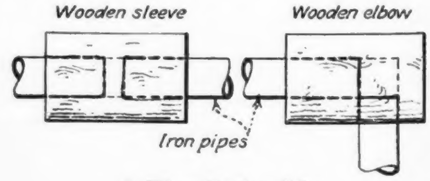


Slide Rail Switch and Turn Showing Use of Cuff or Holder

The use of these devices is shown in the accompanying illustration, which is a temporary switch embodying them both. This "slide rail and turn switch" can be laid off the main track without the use of spikes and ties and can be disassembled and installed again in 15 minutes, according to the inventor.

Pipe Sleeves of Wood Speed Reclamation

During reclamation of a mine after an explosion time is an important factor, and so one often must resort to the use of old material in order to speed up the work. This was the case, related William J. Davies, Edwardsville, Pa., in



A Time-Saving Idea

reclaiming a section of a mine after a recent explosion.

Water was required to mix concrete for the construction of seals and dams, and to carry it to the job by a bucket brigade would have placed an unnecessary hardship upon the men wearing breathing apparatus. So discarded ¾- and 1-in. iron pipes, whose ends were worn and battered, were again made serviceable by utilizing elbow, reducer and straight sleeves made of hardwood blocks in the carpenter shop. These sleeves could be hammered on to a tight fit as the sleeve bore was made slightly smaller than the outside diameter of the pipes. The task of rethreading these

pipes in a sealed area would have been slow and difficult. The scheme here described proved highly successful in speeding up the job and making it easier.

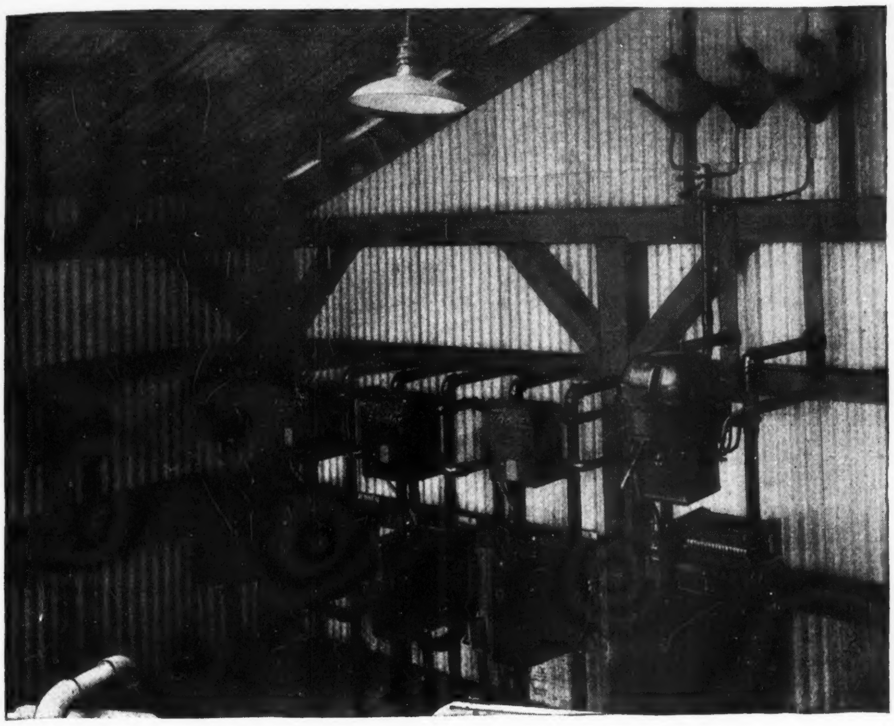
Pipe Bending Made Easy

Pipes may be easily bent where they are of large size by filling them with sand, plugging the ends and bringing to a red heat, according to a wirter in the *Canadian Mining Journal*, Jan. 11, 1929. After the right temperature is reached the pipe is bent, the sand filling keeping it from collapsing.

Dry sand must be used, as the presence of moisture will result in an explosion. Resin also is proposed and where used is melted, poured in the pipe and allowed to solidify, after which the pipe is bent. The resin must never be heated because an explosion will result. Lead also may be used in the same fashion and the writer tells of hearing that water was allowed to freeze in the pipe to be bent, after which the danger of collapse was removed. He very properly remarks, however, that the use of water will burst the pipe if care be not exercised.

Washer Controls Mounted In Simple Manner

Mounting the switch box in one place, the drum box in another and the resistor perhaps several feet from the latter complicates more than necessary the installation of slip-ring motor control. A very simple yet rugged and accessible installation is that in a new addition to the washer at Lewisburg No. 2 mine of the Sloss-Sheffield Steel & Iron Co., of Alabama.



Grouped in a Small Space Yet the Parts Are Accessible

Referring to the photograph, the switch boxes are mounted directly above the respective drums and the resistors immediately back of the drums. The wiring from the drums to the resistors is very short and is located where it will not be bumped, therefore it is carried in the open.

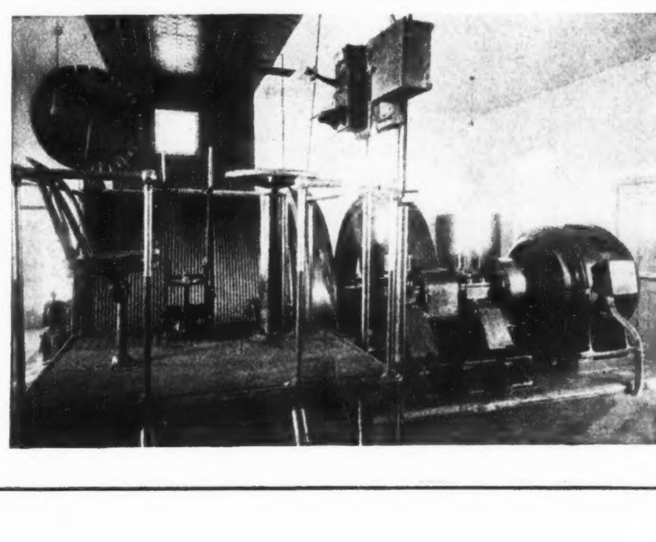
The supporting stands are made of pipe with floor flanges on the legs and wall braces. This is a more simple and rigid type of construction than that obtained by using flat bar stock for making the stands.

Hoist Men With Phase Open in Rotor Circuit

The No. 4 mine hoist of the Union Pacific Coal Co., at Rock Springs, Wyo., is driven by a 400-hp., 2,200-volt 3-phase motor and is equipped with a liquid controller for regulating the speed, according to D. C. McKeehan, chief electrician.

It was difficult to standardize on the proper density of solution in the electrode tank to control the speed when starting trips at the different entries along the slope, to obtain the maximum hoisting speed at full load or to properly control the speed when hoisting the man-trip. In handling man-trips the hoisting engineer was obliged to apply the brake intermittently in order not to exceed the man-trip speed limit. As the slope is over 7,000 ft. long, this was quite an arduous task.

To relieve the situation a single-pole switch was installed in one of the lines leading from the collector rings to the controller. When hoisting men the switch is opened, so that the motor runs at one-half speed and meets the requirements very nicely. When hoisting coal the switch is closed and the motor may be brought to full speed.



No. 4 Mine Hoist, Union Pacific Coal Co.

Extend Cable Service by Self-Aligning Guide

"As compared to the service when using porcelain guides we get five times the life from rubber cable and at least 100 per cent more life from braided cable when using the self-aligning cable guide," said J. C. Baker, general superintendent of the Scotia Coal & Coke Co., Finlow, W. Va. He was referring to the cable guide shown in the accompanying photograph.

Four fiber sheaves are used on the guide. On the end toward the reel there is a single vertical sheave, in the center are a pair mounted horizontally, and at the other end are a pair mounted vertically and on a swinging bracket. With this arrangement the cable rolls freely over the sheaves, regardless of the angle, instead of dragging over a corner of a guide roller or frame.

In order to accommodate splices or other sections of large diameter in the cable, the two sheaves forming a pair are held together by coil springs which are attached to the ends of the axles or bearing pins. One of the pins is mounted in a slot so as to allow

Showing Vertical Sheave Bracket Swung to Extreme Right

for movement. The fiber sheaves are bushed with brass.

This cable guide was developed and patented by R. R. Morton, chief electrician. Six locomotives operating in the Brooklyn mine are thus equipped. These guides were made on a special order by the Beckley Machine & Electric Co., Beckley, W. Va.

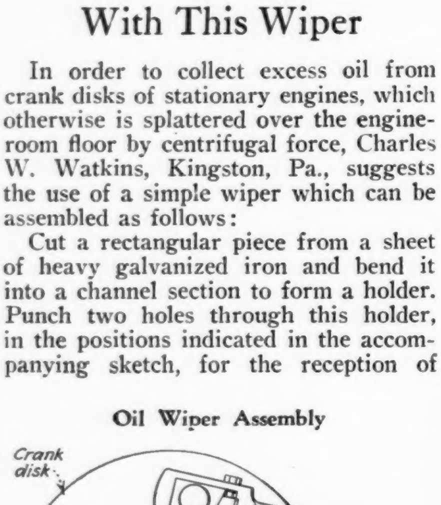
Prevent Oil Splatter With This Wiper

In order to collect excess oil from crank disks of stationary engines, which otherwise is splattered over the engine-room floor by centrifugal force, Charles W. Watkins, Kingston, Pa., suggests the use of a simple wiper which can be assembled as follows:

Cut a rectangular piece from a sheet of heavy galvanized iron and bend it into a channel section to form a holder. Punch two holes through this holder, in the positions indicated in the accompanying sketch, for the reception of two stove bolts which keep the wiping material in place in the holder. The wiping material should extend about ½ in. above the upper edge of the holder and can be of felt, cotton or any other suitable cloth. The stem of the wiper is fashioned from a piece of ½-in. round iron, flattened at one end for attachment by rivets or bolts to the holder and threaded at the other end for anchorage of the wiper unit in a drilled and tapped hole at a convenient point in the engine frame.

The stem can be bent to any convenient angle to suit any location or use and the wiper should be adjusted to make light contact with the disk.

Oil Wiper Assembly



Care of Insulation

Motors should be stored in a dry, clean place until ready for installation. Heat should be supplied, especially for larger high-voltage machines, to protect against alternate freezing and thawing, according to C. W. Falls, industrial engineering department, General Electric Co. This is equally applicable to spare coils.

Motors that have been long in transit in moist atmosphere or that have been idle for an extended period without heat to prevent the accumulation of moisture should be thoroughly dried out before being placed in service. Machines may also become wet by accident, or they may "sweat" as a result of a difference in their temperature and that of the surrounding air, just as cold-water pipes "sweat" in a warm, humid atmosphere. This condition is, of course, very injurious and should be prevented, particularly in the case of large or important motors, by keeping them slightly warm at all times.

Current at a low voltage can be passed through the windings, electric heaters can be used, or even steam pipes may be utilized for protective purposes. In the case of extended idle periods, tarpaulins may be stretched over the motor and a small heater put inside to maintain the proper temperature.

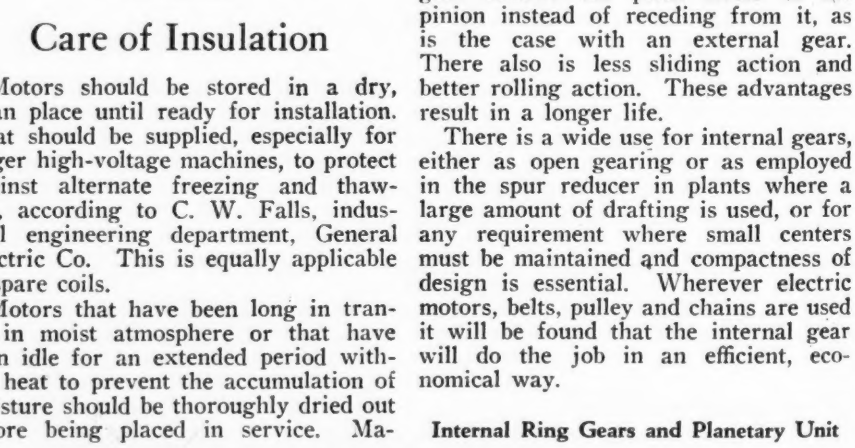
Compact Gear Is Better For Many Purposes

Internal gears, according to Earl F. Kinson, of the Foote Bros. Gear & Machine Co., Chicago, are used to some extent, but have not been as extensively employed as their adaptability to many classes of service permits. The internal gear might be described as a spur gear the teeth of which have been turned inside out or with the teeth extending inward toward the center of the pitch circle. While it is known that this gear has some limitations, the good features outweigh the disadvantages and it has been used in speed reducers and other units because of compactness.

Internal gears, in addition to being compact, have greater strength as there are more teeth in mesh, owing to the fact that the pitch circle of the internal gear follows the pitch circle of the pinion instead of receding from it, as is the case with an external gear. There also is less sliding action and better rolling action. These advantages result in a longer life.

There is a wide use for internal gears, either as open gearing or as employed in the spur reducer in plants where a large amount of drafting is used, or for any requirement where small centers must be maintained and compactness of design is essential. Wherever electric motors, belts, pulley and chains are used it will be found that the internal gear will do the job in an efficient, economical way.

Internal Ring Gears and Planetary Unit



WORD *from the* FIELD

Lake Rate Appeal Dismissed; I.C.C. Powers Undefined

The U. S. Supreme Court refused to pass on the controversy over the powers of the Interstate Commerce Commission in stipulating rates on coal consigned for lake cargo shipment in an order read by Chief Justice Taft on March 5. The court held that the issues involved were moot. The decree of the District Court was reversed and the bill dismissed.

The case reached the high court as the result of an appeal by the Commerce Commission and Northern carriers from an injunction by the District Court of Southern West Virginia enjoining the Commission's action in denying permission to the Southern railroads to reduce rates 20c. on shipments to the lakes following similar action by the Northern roads. The Northern and Southern roads finally agreed to a compromise giving the mines in the Northern fields a differential of 35c. under those in the Southern fields, which rates are now in effect.

Frank E. Taplin, president, Pittsburgh & West Virginia Ry., proposed on March 6 that the differential in favor of the Northern fields be increased to 55c. His suggestion was made at a meeting of railroad officials held at the Pennsylvania Terminal in New York City. The meeting adjourned without action, but Mr. Taplin said he was prepared to go before the Commerce Commission with the proposal for a higher differential.

Anthracite Tax Repealer Gets Favorable Action

The bill presented by Representative Benjamin Jones, Luzerne County, providing for repeal of the tax on anthracite was reported out favorably by the House committee of the Pennsylvania Legislature on March 5. The affirmative recommendation passed by a vote of 18 to 5 following a discussion lasting almost an hour. An attempt to refer the measure to the ways and means committee failed. It was expected that the bill would be passed on first reading.

McGraw-Hill Again Broadens Service to Industry

In order to further broaden its service to American industry the McGraw-Hill Publishing Co., publisher of *Coal Age*, has purchased *Aviation*, the oldest aeronautical magazine in the country. The addition of *Aviation* to the group of 25 engineering, industrial and business papers now published by the organization is in line with the company policy of covering adequately, authoritatively and completely the major engineering, basic industrial and major service activities of the nation.

Aviation was established about twelve years ago by Major Lester D. Gardner, until recently president of the Aeronautical Chamber of Commerce and now president of Aeronautical Industries, Inc. The field of the newest member of the McGraw-Hill group includes aircraft manufacturers, engine and parts makers, airports, distributors and all others who are professionally engaged in aeronautics and represents a hundred million dollar industry. Earl D. Osborn, for a number of years publisher of the paper, will join the McGraw-Hill organization.

New Plants and Equipment To Be Installed

New contracts for topworks and construction work under way or completed at various coal operations reported last month include the following:

American Coal Company of Allegany County, Piedmont mine, Widemouth, W. Va.; contract closed with the Roberts & Schaefer Co. for Menzies Hydro-Separator coal-washing equipment, capacity 100 tons for hour. To be completed May 1.

Stalter & Essex Mining Co., Hobson, Ohio; contract closed with the Roberts & Schaefer Co. for Menzies Hydro-Separator coal-washing equipment and Arms dewatering screens, capactiy 50 tons per hour. To be completed May 1.

United Pocahontas Coal Co., Crumpler, W. Va.; expect to erect new tipple equipped to prepare all commercial grades, capacity 300 tons per hour. Pocahontas No. 3 coal will be treated, the coarser sizes to be washed and the slack air-cleaned. Probably will be completed in the fall.

Valley Mining Co., Inc., Nelsonville, Ohio; additional contract closed with the Roberts & Schaefer Co. for Menzies Hydro-Separator coal-washing equipment and Arms sizing and dewatering screens, capacity 100 tons per hour. To be completed May 1.

West Virginia Coal & Coke Co., Norton mine, Norton, W. Va.; new tipple with modern shaking screens, picking tables and loading booms to prepare lump, egg or nut, slack or a combination mine-run placed in operation in February. Capacity, 400 tons per hour.

Industrial Coal Reserves Drop From 34 to 32 Days

Stocks of anthracite and bituminous coal in the hands of industrial consumers in the United States and Canada on Feb. 1 totaled about 41,000,000 tons, according to the monthly report of the National Association of Purchasing Agents. While coal output increased substantially during January as compared with the preceding month consumption also gained, so that the number of days supply dropped from 34 to 32.

DAYS' SUPPLY OF BITUMINOUS COAL IN VARIOUS U. S. INDUSTRIES

		Change
Byproduct coke	29	+2
Electric utilities and coal-gas plants	51	—4
Railroads	25	—1
Steel mills	31	—3
Other industries	30	—3
Average total bituminous stocks throughout the United States	30	—1

ESTIMATES OF OUTPUT, CONSUMPTION AND STOCKS

	United States Production	Industrial Consumption	On Hand in Industries
Jan. 1928	49,645,000	37,678,000	52,909,000
February	46,933,000	36,301,000	50,595,000
March...	49,452,000	38,588,000	48,388,000
April....	39,081,000	35,230,000	47,432,000
May.....	44,748,000	34,844,000	43,670,000
June....	41,264,000	32,784,000	40,890,000
July.....	41,785,000	33,527,000	40,700,000
August..	48,598,000	33,890,000	39,415,000
September	48,332,000	34,223,000	40,090,000
October..	58,914,000	30,500,000	40,778,000
November	53,498,000	35,879,000	41,520,000
December	49,606,000	37,354,000	41,010,000
Jan. 1929	58,500,000	39,518,000	41,492,000
Feb. 1...	....	....	40,808,000

Stocks of bituminous coal in the hands of commercial consumers on Jan. 1 were 41,800,000 net tons, according to a survey by H. O. Rogers and F. G. Tryon, of the U. S. Bureau of Mines. This showed a decline of 600,000 tons from the total on Nov. 1. On Oct. 1, the date of the last survey, the stocks were 41,100,000 tons, but in October production was in excess of consumption and reserves increased by 1,300,000 tons, reaching 42,400,000 tons on Nov. 1. Thereafter production declined while consumption increased.

Anthracite Shipments Show Sharp Rise in January

Shipments of anthracite during January, 1929, as reported to the Anthracite Bureau of Information, Philadelphia, amounted to 5,811,972 gross tons. This is an increase of 1,288,833 tons over shipments for the same month last year. Unusually warm weather which prevailed during the month of January, 1928, accounts to a great extent for the low tonnage during that month. Some of the mines at that time operated only

a few days a week, while others were shut down entirely.

Shipments by originating carriers for January were as follows, in gross tons:

	January, 1929	January, 1928
Reading Company	1,165,139	965,184
Lehigh Valley	877,811	753,781
Central R.R. of New Jersey	540,893	438,807
Dela., Lackawanna & Western	980,541	773,534
Delaware & Hudson	779,237	509,382
Pennsylvania	508,926	414,075
Erie	618,777	402,793
N. Y., Ontario & Western	130,494	99,855
Lehigh & New England	210,154	165,728
Total	5,811,972	4,523,139

Central Pennsylvania Mines Recovering Lost Markets

Representatives of more than 100 operating companies attended the annual meeting of the Central Pennsylvania Coal Producers' Association, held at Altoona, Pa., Feb. 15. These officers were re-elected: President, B. M. Clark; vice-president, G. Webb Shillingford; statistician, W. A. Jones; secretary-treasurer, Charles O'Neill.

Harry L. Gandy, executive secretary of the National Coal Association, discussed the Watson bill to regulate the coal industry and other bills before Congress. Mr. O'Neill told of various measures affecting the industry that were before the Pennsylvania Legislature and Mr. Jones touched on tax affairs. Reports also were presented by the valuation and traffic committees. It was brought out that approximately 40,000,000 tons of coal were produced in the district in 1928 and that although this was a slight falling off in percentage in relation to the country as a whole the improvement shown in the late months of the last year indicated progress in regaining lost business.

At the annual meeting of the Eastern Ohio Coal Operators' Association, held in Cleveland, these officers were elected: President, W. L. Robison, vice-president, Youghiogheny & Ohio Coal Co.; vice-president, R. L. Ireland, Jr., general manager, Wheeling & Lake Erie Coal Mining Co.; treasurer, Elliott Willard, treasurer, United States Coal Co.; secretary, D. F. Hurd.

Koppers Acquires Mines

Mines of the Black Betsy Consolidated Coal Co. at Elkridge and thereabouts on Armstrong Creek in Fayette County, West Virginia, have been sold to the Koppers interests of Pittsburgh, Pa. These mines are in the Powellton seam, which is a high-volatile coking coal low in sulphur.

To Build Briquetting Plant

An additional plant, to contain five carbonizers, is planned by the Lehigh Briquetting Co., Lehigh, N. D. An outlay of about $400,000 will be made for the new structure. R. W. Richardson, St. Paul, Minn., is the engineer.

Indiana Fuel Conference To Cover Wide Range

The second annual Indiana Fuel Conference, to be held at Purdue University, Lafayette, Ind., April 4 and 5, has arranged a program designed to interest producers, distributors and users of bituminous coal and manufacturers of coal-burning equipment. Following an inspection trip the first day representatives of manufacturers will describe recent developments of domestic fuel burning equipment. In the afternoon these papers will be read: "Heat Losses to Be Overcome by Domestic Heating Plants," by J. D. Hoffman, head, department of mechanics, Purdue; "Smokeless Combustion in Domestic Heating Plants," Victor J. Azbe, consulting engineer, St. Louis, Mo.; "What Shall the Coal Merchant Do?" Ray Macy, president, Peoples Coal & Cement Co., Indianapolis, Ind. Milton E. Robinson, Jr., president, National Retail Coal Merchants' Association, and F. B. Huntress, assistant executive secretary, National Coal Association, will speak at the banquet in the evening.

Discussion on the second day will be devoted to "Fusibility of Ash," A. L. Langtry, vice-president, Commercial Testing & Engineering Co., Chicago; "Recent Developments in Burning Pulverized Coal," Vernon Leach, combustion engineer, Peabody Coal Co., Chicago; "Efficiency of Indiana Coal as a Locomotive Fuel," John E. Bjorkholm, assistant superintendent, motive power, C. M. & S. P. R.R., Milwaukee, Wis.; "Fitting the Furnace to the Coal," A. B. Racht, Holland Furnace Co., Holland, Mich.; "The Future of Indiana Coal in Its Logical Market," O. L. Scales, sales manager, George A. Enos Coal Co., Indianapolis, Ind.

New Coal Company Launched To Stabilize Industry

The first step in what its sponsors propose as a movement to "stabilize the bituminous coal industry" was taken with the incorporation of the Amalgamated Coal Corporation on March 1 at Wilmington, Del. The new organization has an authorized capital of $50,000,000 and proposes to issue $15,000,000 in bonds.

The incorporators plan to organize the industry into a few large units in order to improve methods of production, reduce overheads, eliminate duplication in selling effort and to establish laboratories with scientists employed to study methods of converting coal into byproducts cheaply enough to meet competing processes. A large number of producing and consuming companies are said to be active in the scheme.

S. R. Jennings is president of the new company; S. B. Pearce, vice-president; Carel Robinson, vice-president and general manager; D. R. Tomb, secretary-treasurer, and the following are directors in addition to the above officers: Henry N. Barker, lawyer, Bristol, Va.; Charles R. Flint, Flint & Co., New York; C. P. Harley, Defiance, Ohio; A. S. Higginbotham, Tazewell, Va.; P. R. Hilleman, secretary, Harbison-Walker Refractories Co., Pittsburgh, Pa.; J. Fred Johnson, president, First National Bank, Kingsport, Tenn.; Victor S. Johnson, president, Mantle Lamp Co. of America; John H. Jones, Pittsburgh, Pa.; P. J. Kelly; C. E. Lilley, Superior Supply Co., Bluefield, W. Va.; J. R. Simmonds, lawyer, Johnson City, Tenn., and J. D. Spangler, Defiance, Ohio.

The general offices of the corporation are at Johnson City, Tenn., with a branch office in the Dixie Terminal Building, Cincinnati, Ohio, and an office will be opened in the Chamber of Commerce Building, Pittsburgh, Pa. The New York headquarters will be at 17 Battery Place.

The firm of Stuart, James & Cooke, Inc., 17 Battery Place, New York, have been retained as consulting engineers.

Hammond and Ayres Honored By A.I.M.E.

Many honors were conferred at the annual dinner of the American Institute of Mining and Metallurgical Engineers, held in New York City, Feb. 20. John Hays Hammand received the William Lawrence Saunders medal for achievement in mining and E. C. Bain the Robert Woolson Hunt medal for the best paper on iron and steel. W. E. Griffiths, Mr. Bain's collaborator, received a special prize from the latter foundation. Sidney Rolle accepted on behalf of P. D. Merica the James Douglas medal for distinction in nonferrous metallurgy, Mr. Merica not being well enough to be present.

W. S. Ayres, consulting engineer, Hazleton, Pa., was designated as one of the "Legion of Honor" of the institute. In this there are 33 members, all of whom have been members for 50 years or more. Mr. Ayres was the member of longest standing present and spoke for the others. He became a member in 1873. Others of interest to coal men are H. M. Chance, 1874; H. S. Drinker; John Markle, 1879; I. P. Pardee, 1873, and W. McDermott, 1874.

Short addresses were made by G. O. Smith, F. W. Bradley, the outgoing and incoming presidents, respectively, and by the recipients of the awards. Mr. Smith speaking on "Engineering Standards for Society."

Work on New Road to Start

Construction work is to be begun in the near future on the Nicholas, Fayette & Greenbrier R.R. from Swiss, in Nicholas County, to Nallen, in Fayette County, W. Va., according to officials of the Chesapeake & Ohio Ry. The road will tap certain coal sections of the Kanawha and New River fields heretofore inaccessible because of lack of transportation facilities.

To Study Coal by Districts At Cincinnati Convention

Developments in mining methods will be described and practical mine operating problems in the various coal districts of the country will be discussed at the sixth annual convention of practical coal operating men, to be held by the manufacturers' division of the American Mining Congress May 13-17 at Cincinnati, Ohio. Complete mining operation will be considered in relation to each district concerned, from the face of the mine to the finished product, embracing cleaning, mechanical loading, etc. An exposition of coal-mining equipment, as usual, will be a feature of the convention.

The opening session, May 13, will be devoted to the status of mechanization. Among the addresses scheduled for that session are: "Mechanized Mining at the Advent of 1929," L. E. Young, vice-president, Pittsburgh Coal Co.; "Practical Application of Mechanization in Coal Production," G. B. Southward, mechanization engineer, American Mining Congress; "Statistics on Mechanical Mining," F. G. Tryon, U. S. Bureau of Mines.

At the morning session May 14, devoted to the anthracite industry of Pennsylvania, there will be papers on "Recent Developments in Anthracite Mining," by Cadwallader Evans, general manager, Hudson Coal Co.; "Underground Distribution and Handling of Supplies at the Hudson Coal Co." J. F. K. Brown, assistant to president, Hudson Coal Co.; "Mining System of the Glen Alden Coal Co.," George Beehler; "Underground Drainage and Pumping," Charles Dorrance, consulting engineer, Wilkes-Barre, Pa.

At the afternoon session papers will be read on "Recent Developments in Mining Methods—Colorado, Wyoming, New Mexico, Utah and Montana," by D. A. Stout, Colorado Fuel & Iron Co.; "Handling Labor Problems at the Stag Canon Fuel Co.," W. D. Brennan, general manager, Phelps Dodge Corporation; "Mining System of the Sheridan-Wyoming Coal Co.," Edward Bottomley, general superintendent; "Power at the United States Fuel Co.," D. D. Muir; "Cleaning Coal—Pacific Coast Coal Co.," George Watkin Evans, consulting engineer, Seattle, Wash.

Developments in mining methods in Illinois, Indiana and western Kentucky will be covered by David Ingle, president, Ayrshire Coal Co. on May 15. The substitution of pit car loaders in rooms and entries will be treated by Mr. Mitchell, Superior Coal Co., and H. A. Treadwell will talk on maintenance and inspection at Chicago, Wilmington & Franklin Coal Co. In the afternoon addresses are scheduled on "Recent Developments in Mining Methods in the Southeast" by D. A. Thomas, president, Montevallo Coal Mining Co.; "Training Men to Become Foremen and Superintendents," M. L. Garvey, general manager, New River Co.; "Mining Methods in Gaseous Mines," L. T. Putman, general manager, Raleigh-Wyoming Mining Co.; "Cleaning Coal at the Tennessee Coal, Iron & Railroad Co.," C. E. Abbott, general manager of mines.

A session on safety, May 16, will offer: "Accidents in Hand vs. Mechanical Loading," Dr. Young; "Safety Court of the Consolidation Coal Co.," Thomas G. Fear, general manager of operations, Consolidation Coal Co. and "Ventilation in Concentrated Mining," A. W. Hesse, Buckeye Coal Co.

Bituminous mining in Pennsylvania, Ohio, northern West Virginia and Maryland will be considered at the afternoon session, May 16. The papers so far scheduled include: "Developments in Mining Methods in Pennsylvania and Ohio," F. R. Lyon vice-president, Consolidation Coal Co.; "System of Wages in Relation to Mechanical Loading," E. J. Christy, Wheeling Township Coal Mining Co.; "Scraper Mining at Allegheny River Mining Co.," Fred Norman, chief engineer; "Conveyor Mining at Pennsylvania Coal & Coke Co.," S. W. Blakslee, mine superintendent; "Main-Line Haulage at Berwind-White Coal Mining Co., by E. J. Newboker, mine superintendent; "Cleaning Bituminous Coal," E. K. Davis, Peale, Peacock & Kerr.

The closing session May 17 will cover developments in the Southwest with George Wulff, Western Coal & Mining Co., presiding, and J. G. Puterbaugh, president, McAlester Fuel Co., reviewing the general situation and W. E. Widmer, president, Elmira Coal Co., describing the mining system at his operations.

Organize New Companies

The Russell Coal Co. has just been organized with a capital stock of $50,000 to engage in the coal business in northern West Virginia. The principal office of the company will be at Clarksburg, W. Va. Incorporators include H. L. Robinson, John S. Stump, R. F. Schaffner, N. L. Jackson and T. M. Baldwin, all of Clarksburg.

The Ajax Smokeless Coal Co., of Emoryville, Mineral County, W. Va., has received a charter. The company is capitalized at $25,000. Principally interested in the new company are Eldon O. Hood, of Emoryville; Robert L. Stallings, F. Ernest Brackett, Theodore F. Schaffer and Bancroft Hetzel, of Cumberland, Md.

Rosedale Mine Active

Operations have been resumed at the Rosedale mine, near Morgantown, W. Va., after a shutdown of more than a year. Under normal conditions the mine employs about 200 men.

Plans are shaping for reopening the Roderfield-Pocahontas coal operation near Roderfield, W. Va. The plant has been closed down for more than a year and a half.

Renew Contract to Mine Colstrip Property

The Northern Pacific Ry. has closed a contract with Foley Brothers, Inc., of St. Paul, Minn., for operating its Colstrip (Mont.) coal mining properties which involves handling 32,000,000 tons of coal and earth. The equipment for this contract will cost more than $1,500,000.

The new contract, according to Charles Donnelly, president of the railway company, covers the operation, for a period of about 10 years, of the company's coal mining properties. Mining is by the open-pit method. The seam is about 27 ft. thick and the overburden varies from 10 to 50 ft. in depth. Twenty million cubic yards of overburden is to be removed under the terms of the contract, which also calls for the loading of approximately 12,000,000 tons of coal.

The Colstrip property, which is in the Rosebud field, was opened five years ago and has been continuously operated by Foley Brothers under a contract which has just expired.

Pittsburgh Coal Co. Report Shows Improvement

Definite and encouraging progress in the production and marketing of its coal is shown in the annual report of the Pittsburgh Coal Co. for 1928. The net loss in operating revenue last year was $493,870.67 as against $1,880,597 in 1927, $2,114,677 in 1926 and $1,266,940 in 1925. Coal production by the company in 1928 totaled 11,395,085 net tons, compared with 9,128,932 tons in the preceding year. Of last year's output 10,577,040 tons was produced in the Pittsburgh district, an increase of 2,439,046 tons over that of 1927. In its advertising announcing a recent bond issue the company stated that in the last quarter of 1928 "net earnings after all charges except federal taxes were $487,100."

The Lehigh Coal & Navigation Co. reports for 1928 a net income of $2,525,430 after interest, taxes, depreciation and depletion. This compares with earnings of $2,932,295 in 1927.

The Lehigh Valley Coal Co. reports for last year net income of $1,219,521 after depreciation, depletion, interest, federal taxes, etc. This compares with $2,205,197 in 1927. Lehigh Valley Coal Sales Co. reports for the year profit of $484,717 after costs, depreciation, etc., but before federal taxes. This compares with net profit of $352,773 after depreciation, federal taxes, etc., in 1927.

A preliminary earnings statement of the Philadelphia & Reading Coal & Iron Co. for 1928 shows net income of $34,376, compared with a deficit of $7,654,281 in 1927.

Elk Horn Coal Corporation, Inc., reports for 1928 net profit of $19,992 after depreciation, depletion, interest, etc., compared with a net loss of $155,158 in 1927. For the quarter ended Dec. 31,

1928, net profit amounted to $120,382 after the above charges, comparing with net profit of $52,456 in the Sept. 30 quarter, net loss of $49,155 in the June 30 quarter and net loss of $103,691 in the March 31 quarter of 1928.

The Pittsburgh Terminal Coal Corporation and subsidiaries report for 1928 a net loss of $893,003 after depreciation, depletion, interest and other charges. This compares with a net loss in 1927 of $953,640.

The Truax-Traer Coal Co. and subsidiaries, from date of acquisition, report for 1928 net profit of $437,575, after depreciation, depletion, interest, federal taxes and other charges, equal, after 8 per cent preferred dividends paid, to $1.65 a share on 245,000 no par common shares.

Net income of United Electric Coal Co. for the quarter ended Jan. 31, 1929, was $199,925 after interest, depletion, depreciation, federal taxes, etc., comparing with $178,621 in the corresponding period of the preceding year. For the six months ended Jan. 31, net income totaled $366,134, against $426,905 in the same period of previous year.

Coming Meetings

American Society for Testing Materials; annual spring group meeting, Stevens Hotel, Chicago, March 19-22.

Second Annual Indiana Fuel Conference, April 4-5, at Lafayette, Ind.; under direction of Engineering Extension Department and School of Mechanical Engineering, with School of Chemical Engineering, Purdue University.

American Management Association; annual spring convention, week of May 6 at Hotel Pennsylvania, New York City.

Mine Inspectors' Institute of America; annual meeting, May 7-9, at Whittle Springs Hotel, Knoxville, Tenn.

International Railway Fuel Association; annual meeting, May 7-10, at Hotel Sherman, Chicago.

Western Canada Fuel Association; annual meeting, May 13-15, at Drumheller, Alberta, Canada.

American Mining Congress; annual convention and exposition of mining machinery, May 13-17, at Cincinnati, Ohio.

National Retail Coal Merchants' Association; annual meeting, May 27-29, at Chicago, Ill.

National Association of Purchasing Agents; annual convention, June 3-6, at Hotel Statler, Buffalo, N. Y.

American Wholesale Coal Association; annual convention at Pittsburgh, Pa., June 11 and 12.

Colorado and New Mexico Coal Operators' Association; annual meeting June 19, at 513 Boston Building, Denver, Colo.

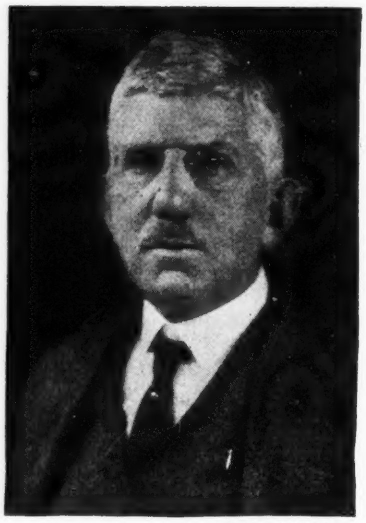
American Institute of Electrical Engineers; annual summer convention, June 24-28, at Swampscott, Mass.

Illinois Mining Institute; annual meeting and river trip on Steamer Cape Girardeau, leaving St. Louis, Mo., June 27 and returning June 30.

American Society of Mechanical Engineers, July 1-4, Salt Lake City, Utah.

Oklahoma Coal Operators' Association; annual meeting, Sept. 3, at McAlester, Okla.

Eighth International First Aid and Mine Rescue Contest, sponsored by U. S. Bureau of Mines; Sept. 12-14, at Kansas City, Mo.



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S. Pemberton Hutchinson

S. Pemberton Hutchinson Dies of Pneumonia

S. Pemberton Hutchinson of Philadelphia, Pa., president of the Westmoreland Coal Co., died of pneumonia Feb. 16 in the Bryn Mawr Hospital, near Philadelphia, in his 68th year. He had been ill three days.

Upon his graduation from the University of Pennsylvania Mr. Hutchinson entered the employ of the Pennsylvania R.R. as a rodman and for many years was assistant engineer of the Philadelphia division. He left the railroad's employ to enter the coal business. He was a director and former president of the National Coal Association and a director of the American Mining Congress, Stonega Coke & Coal Co. and Virginia Coal & Iron Co.

FAIRFAX S. LANDSTREET, JR., vice-president of the Landstreet-Downey Coal Co., Huntington, W. Va., died suddenly Feb. 17 in Cincinnati, Ohio, from complications following an operation. Born 33 years ago, Mr. Landstreet was a graduate of Yale University and served as an officer of the 12th Field Artillery in France. He also was vice-president of the Operators' Association of the Williamson Field.

T. H. HOOPER, president of the Hooper-Mankin Fuel Co., Huntington, W. Va., died Feb. 10 at Huntington. Death was caused by a fibrous growth.

NICHOLAS EVANS, aged 70, mine inspector of the 24th Bituminous District of Pennsylvania, died from an attack of heart trouble at his home in Johnstown, Pa., on Feb. 12. Mr. Evans had been in the state mine department for many years and was known to all mining men in his state and to many in other states. He was president of the Coal Mining Institute of America in 1925.

GROVER C. WOLFE, of Estill, Floyd County, Ky., general superintendent of operations of the Wells Elkhorn Coal Co., died Feb. 17 as the result of gunshot wounds received a few hours earlier. In the altercation which is said to have taken place on the railroad track near the mine, another man was killed and a third seriously wounded.

C. L. DUER, 52, district mining supervisor of coal and mineral leasing operations in Colorado, New Mexico and Wyoming for the U. S. Geological Survey, died at his home in Denver, Colo., Feb. 22, after an illness of several weeks.

ALEXANDER P. BARNARD, 60, general manager, Beaver Dam Coal Co., Beaver Dam, Ky., was found dead in bed in the company hotel Feb. 19. Death was reported to have been caused by apoplexy.

JOHN A. PORTER, mine inspector of the 14th West Virginia inspection district, which includes part of the Kanawha field, died Feb. 13 at Gauley Bridge, W. Va.

Slemp Acquires Interest In Elkhorn Collieries

Former Congressman C. Bascom Slemp, of Virginia, has become a leading stockholder and vice-president of the Elkhorn Collieries Co., at Thornton, in the Whitesburg section of Kentucky. A. C. Slemp, a near relative, is superintendent of the plant, taking the place of Arthur Bastin, who goes with the Elkhorn Coal Co. at Kona. P. W. Slemp has relinguished his connection with the Elkhorn Collieries.

Reading Plans to Expand

An issue of $30,800,000 6 per cent convertible debenture bonds is to be offered by the Philadelphia & Reading Coal & Iron Corporation to finance an extensive expansion project at the anthracite properties of its subsidiary, the Philadelphia & Reading Coal & Iron Co. Concentration and consolidation of preparation plants together with complete electrification of mechanical equipment and transportation are high lights in the program, according to A. J. Maloney, president of the coal company. The most modern equipment will be installed.

New Explosive Out

A new permissible high explosive, known as Monobel No. 12 L. F., has been developed by E. I. du Pont de Nemours & Co. In mines where test shots have been tried the new permissible was effectual in breaking 5-ft. seams of coal, producing an unusual proportion of lump and a corresponding decrease of slack.

While it is a permissible explosive, its effect on the coal most nearly approaches the action of black powder. A decided reduction in the volume of fumes is among advantages claimed for this explosive. Its unit deflective charge is 242 grams; velocity of detonation, 9,120 ft. per second in the $1\frac{1}{4}$-in. diameter; class B fumes.

Powdered-Coal-Burning Boat Is Launched

The *Dwight F. Davis,* said to be the first boat ever designed especially to burn pulverized coal, was launched Feb. 9, in the Kanawha River at Charleston, W. Va. The new vessel is a towboat built for the War Department and named for the Secretary of War. The boat will be used in the Warrior River.

To Convert West Alsek For Pulverized Coal

As a further step in the adaptation of pulverized coal burning to sea-going vessels a contract has been entered into with the Todd Shipyards Corporation, New York, by the U. S. Shipping Board Merchant Fleet Corporation to convert the steamer *West Alsek* from a hand-fired coal-burning vessel to a burner of pulverized coal. The *West Alsek* is a steel cargo vessel of 8,529 deadweight tons built in 1918.

Fewer Workers, More Earned At Mines in December

Employment in coal mining—both anthracite and bituminous—decreased 0.9 per cent in December, 1928, as compared with the preceding month, while payroll totals increased 1.2 per cent, according to the monthly Labor Review of the U. S. Department of Labor. The increase in payroll despite the decrease in employment was due to steadier operation. The 800 mines for which reports were received had 173,171 employees in December, with total payrolls in one week of $4,828,695.

Employment in anthracite mines alone was 0.9 per cent less in December than in November, but payroll totals were 11.5 per cent higher. Church celebrations and other holidays curtailed operating time in November, whereas in December operating time was steadier. Returns were made for 59 mines having 39,009 employees in December and payroll totals in one week of $1,393,591.

Employment in bituminous mines decreased 0.9 per cent in December as compared with the preceding month and payrolls decreased 2.4 per cent. The decline in payroll totals was due largely to a wage disagreement in one region of the Mountain geographic division, which caused a complete stoppage of operations. Both employment and payroll totals were considerably reduced in December in the South Atlantic division, several mines having been idle which were in operation in November. The 740 mines for which reports were received had in December 134,162 employees, with payroll totals in one week of $3,435,104. The details for each geographic division are shown in the accompanying table.

Utility Builds Coal Plant

The finishing touches are now being put on a new $5,000,000 coal power plant for the Alabama Power Co. at Gorgas, on the Warrior River 75 miles from Birmingham. The new plant will be put into service when for any reason hydro-electric power facilities are not available.

Utility Acquires Mines

The Elkhorn Utilities Co. has just taken over a half-dozen coal operations in the Shelby Creek section of Kentucky, along a branch of the Chesapeake & Ohio Ry. on the Pike County border, and has started them on full-time operation. It is said that improvements will be made, beginning at once.

Employment and Payroll Totals in Identical Bituminous Mines During One Week Each in November and December, 1928

Geographic Division	Mines	Number on Payroll Nov. 1928	Dec. 1928	Per Cent Change	Number on Payroll Nov. 1928	Dec. 1928	Per Cent Change
Middle Atlantic	218	46,639	47,376	+ 1.6	$1,274,885	$1,258,656	— 1.3
East North Central	115	17,881	18,177	+ 1.7	484,875	502,210	+ 3.6
West North Central	38	4,081	4,511	+11.5	98,742	119,186	+20.7
South Atlantic	192	30,649	28,577	— 6.8	786,495	721,124	— 8.3
East South Central	114	26,606	25,959	— 2.4	563,268	559,101	— 0.7
West South Central	19	1,482	1,494	+ 0.8	40,810	42,647	+ 4.5
Mountain	36	6,552	6,543	+ 0.3	223,979	185,118	—17.4
Pacific	8	1,475	1,485	+ 0.7	46,848	47,062	+ 0.5
All divisions	740	133,335	134,162	— 0.9	3,519,902	3,435,104	— 2.4

Per Cent of Change in Each Line of Employment, November to December, 1928

Line of Employment	Establishments	Number on Payroll Nov. 1928	Dec. 1928	Per Cent Change	Number on Payroll Nov. 1928	Dec. 1928	Per Cent Change
Manufacturing	11,752	3,252,160	3,245,412	— 0.1*	87,662,458	88,339,215	+ 1.6*
Coal Mining	799	174,696	173,171	— 0.9	4,769,238	4,828,695	+ 1.2
Anthracite	59	39,361	39,009	— 0.9	1,249,336	1,393,591	+11.5
Bituminous	740	135,335	134,162	— 0.9	3,519,902	3,435,104	— 2.4
Metalliferous Mining	253	42,865	43,893	+ 2.4	1,267,697	1,330,378	+ 4.9
Public Utilities	5,457	464,309	460,927	— 0.7	13,742,982	13,741,346	†
Trade	2,768	172,020	205,141	+19.3	4,293,487	4,806,918	+12
Wholesale	1,114	35,284	35,642	+ 1	1,020,573	1,032,670	+ 1.2
Retail	1,654	136,736	169,499	+24	3,272,914	3,774,248	+15.3
Hotels	465	82,147	80,720	— 1.7	‡1,415,391	1,406,618	— 0.6
Total	21,494	4,188,200	4,209,264	+ 0.5	113,151,253	114,453,170	+ 1.2

*Weighted per cent of change; remaining percentages of change, including total, are unweighted.
†Less than one-tenth of one per cent.
‡Cash payments only

Contact Committees Named By Coal Associations

A contact committee to meet with similar committees from the American Wholesale Coal Association and the National Retail Coal Merchants' Association has been announced by Walter Barnum, chairman of the Market Research Institute of the National Coal Association. The committee is as follows:

H. A. Glover, (chairman), vice-president, Knox Consolidated Coal Co., Indianapolis, Ind.; Frank Armstrong, general manager, Mather Collieries Co., Cleveland, Ohio; G. Dawson Coleman, president, Ebensburg Coal Co., Philadephia, Pa.; Brent Hart, president, Hart Coal Corp., Madisonville, Ky.; Joseph E. Hitt, president, Northern Illinois Coal Corporation, Chicago; W. A. Richards, president, Majestic Collieries Co., Bluefield, W. Va., and W. M. Wiley, vice-president, Boone County Coal Corporation, Sharples, W. Va.

The committee of the American Wholesale Coal Association to meet with the committee of the National, as announced by R. B. Starek, of Chicago, president of the former Association, includes Fred Legg, president, Logan & Kanawha Coal Co., Cincinnati, Ohio; F. J. Waldo, president, Waldo, Egbert & Maltby, Buffalo, N. Y., and L. F. Leighton, president, Carbon Coal & Coke Co., Boston, Mass. Ira C. Cochran, commissioner of the association, will serve as secretary of the committee.

The National Retail Coal Merchants' Association's committee, appointed by M. E. Robinson, Jr., president, comprises this personnel: Frank E. Carey (chairman), president, F. E. Carey Coal Co., Chicago; Luke D. Drury, treasurer and general manager, Ellison & Hawes, Inc., Richmond, Va.; W. W. Griffith, chairman of the board, Griffith-Consumers Co., Washington, D. C.; Mill Alma Z. Jost, president, Zettelmeyer Coal Co., Cleveland, Ohio; Ray Macy, president, Peoples Coal & Cement Co., Indianapolis, Ind.; John J. O'Connor, vice-president, Wisconsin Ice & Coal Co., Milwaukee, Wis.; Albert Silk, president, Albert Silk Coal Co., Topeka, Kan.

Attacks Lower Rates On Washed Coal

A protest against the practice of railroads in carrying "washed" anthracite at lower rates than "dry" coal has been filed with Chairman Lewis of the Interstate Commerce Commission by Representative Douglass, of Massachusetts.

Anthracite operators have expressed a willingness to appear before the commission, if called, to answer Congressman Douglass' charges. One official explained that it is customary for the companies to make an allowance for water in the coal and, he added, there was no deterioration in quality as a result of the use of water cleaning processes.

Washington Letter

By Paul Wooton
Special Correspondent

A NEW statistical service for the coal industry, designed to show the trend of consumption in the principal markets and among the principal classes of consumers, was launched early in March by the Bureau of Mines. This service is being issued as a supplement to the regular weekly coal report and will be distributed on application to the chief of the economic branch of the Bureau.

According to F. G. Tryon, the Bureau's coal statistician, the subject of consumption is the blind spot of the present statistical structure. Much is known of coal production. With the placing of the stock reports on a regular quarterly basis the subject of consumers' stocks also is covered. The other great factor in the equation of supply and demand—the rate of consumption—has been neglected.

To remove this blind spot the coal division began, a year ago, to calculate the average weekly consumption in each quarter. Knowing the production, imports, exports and the changes in stocks, it was a simple matter to determine the average consumption for the period. Averages, however, always are deceptive. While the average for the country is falling, there always are some classes of consumers or some parts of the country where the demand is increasing. Conversely, when consumption for the entire country is increasing there are always markets in which it is falling off.

The new service aims to locate the favorable spots on the coal-market map and to separate them from the unfavorable spots. The country has been divided into twelve principal coal-consuming areas. This service will watch the movement of consumption in each of these areas.

The most surprising variations are found between districts. Unusually cold weather, changes in general business, new hydro-electric plants, heavy rains filling storage reservoirs, a change in the price of fuel oil or a new pipe line all are illustrations of the forces which cause demand to vary in a particular district.

The Bureau's new service is intended to round out existing statistics by distinguishing the markets that are expanding from those that are contracting. It will cover the coal used for railroads, for general industrial purposes, as well as that used by public utilities and the coke industry. Prompt publication will place the data in the hands of the industry as fast as it can be compiled.

Wholesale Convention Set

The annual convention of the American Wholesale Coal Association will be held in Pittsburgh, Pa., on June 11 and 12. Clyde E. Speer, president, Clyde E. Speer Coal Co., of that city, is general chairman of the convention committee. Seth W. Morton, Albany, N. Y.; George E. Copeland, Boston, Mass., and George M. Harsh, Toledo, Ohio, were appointed on the program committee by R. B. Starek, of Chicago, president of the association.

Byproduct Coke Output Up; Beehive Production Falls

Byproduct coke production established a new high record of 48,205,577 net tons last year, an increase of 9.8 per cent over 1927, according to preliminary figures of the U. S. Bureau of Mines. Beehive coke production, on the other hand, dropped to 4,376,000 tons, a decrease of 39.3 per cent from 1927. The coal consumed in the manufacture of coke in 1928 amounted to 69,260,000 net tons charged in byproduct ovens and 6,901,000 tons in beehive ovens.

Survey on Domestic Stokers

A survey of domestic coal-burning equipment requiring electric current will be made by the National Coal Association, Harry L. Gandy, executive secretary, has advised the National Electric Light Association. When it has been completed a statement will be submitted to the electric light association for use in a special report similar to one recently issued on domestic oil burners.

Storm King Tipple Burns

Fire on Feb. 17 destroyed a tipple, headhouse and machinery of the Trace Fork Mining Co. at Storm King, Perry County, 4 miles north of Hazard, Ky. The flames, which started in the headhouse, burned the entire length of the 200-ft. structure, destroying 100,000 ft. of lumber, the three-track tipple, conveyors and motors, entailing a loss of over $50,000.

King Coal's Calendar for February

Feb. 1—Hazard Coal Operators' Exchange discusses coal legislation at annual meeting and elects as president J. B. Hilton, vice-president, Columbus Mining Co.

Feb. 7—Pittsburgh Coal Co.'s annual report for 1928 shows that deficit was cut from $1,880,597 in preceding year to $493,871. In the last quarter of the year the net earnings after all charges except federal taxes were $487,100, according to advertisements of the company's recent bond issue.

Feb. 8—Extension of anthracite wage contract for five years after expiration of present agreement and repeal of anthracite tax urged at meeting of 60 bankers at Wilkes-Barre, Pa., presided over by Alvan Markle, Jr.

Feb. 9—Senate committee on interstate commerce appoints subcommittee, consisting of Senator Goff, Republican, of West Virginia; Senator Glenn, Republican, of Illinois, and Senator Wheeler, Democrat, of Montana, to consider the Watson bill (S. 4490) to regulate the bituminous coal industry. The subcommittee planned to analyze all phases of the situation as brought out by testimony and argument on the bill, which was prepared by counsel for the United Mine Workers, and report to the whole committee.

Feb. 11—Brief challenging right of Interstate Commerce Commission to prohibit reduction by Southern railroads of rates on coal shipped to the lakes filed by counsel for Southern coal operators in Supreme Court to be used in oral argument before high court.

Feb. 14—Stocks of bituminous coal in the hands of commercial consumers as of Jan. 1 were 41,800,000 tons, according to the Bureau of Mines survey. This showed a decline of 600,000 tons in two months and of 13,700,000 tons in a year.

Feb. 15—Northern Pacific Ry. closes contract for operation of its open-pit coal-mining properties at Colstrip, Mont., for period of about ten years. Equipment, including two large shovels, costing about $1,500,000 will be required.

Feb. 16 — Property of Consolidated Connellsville Coke Co., Uniontown, Pa., including Grays Landing and Mount Sterling coke plants and 400 acres of coal land along Monongahela River, sold for $150,500 to Pennsylvania Company for Insurances on Lives & Granting Annuities, Philadelphia, representing mortgage and bond holders.

Feb. 18—Judge Linn D. Hay, in Superior Court at Indianapolis, Ind., denies petition to enjoin Knox Consolidated Coal Co. from operating its mines at Bicknell on wage scale less than provided in Terre Haute agreement between Indiana Coal Operators' Association and United Mine Workers.

Feb. 19—Abolition of coal and iron and railroad police proposed in bills presented in Pennsylvania Legislature by Representatives Musmano of Allegheny County and McDonald of Cambria County. Senator Mansfield of Allegheny offers measure providing for direct supervision of coal and iron police by the Governor.

Feb. 19-20—Argument heard by U. S. Supreme Court in lake cargo rate appeal growing out of cancellation by Interstate Commerce Commission of 20c. reduction on lake cargo coal proposed by railroads serving Southern mines and the setting aside of the cancellation by the U. S. District Court of southern West Virginia. Counsel for the I.C.C., the Northern railroads, Northern operators and the Pittsburgh Operators' Lake Rate Committee argued in support of the I.C.C. decision. John W. Davis and other attorneys represented the Southern operators in support of the lower court's ruling.

Feb. 22—Tariff on petroleum and its products urged at hearing before ways and means committee of House of Representatives at Washington by Harry L. Gandy, executive secretary, National Coal Association. Mr. Gandy asserted that the importation of crude petroleum, duty free, was detrimental to the bituminous coal industry.

Personal Notes

John A. Clark, Jr., for many years prominent in the coal industry in northern West Virginia and at one time president of the Northern West Virginia Coal Operators' Association, has gone to Scranton, Pa., to become identified with the Pennsylvania Coal Co.

Edward L. Keane, purchasing agent for the Philadelphia & Reading Coal & Iron Co., retired March 1 after completing nearly half a century of service to his company.

James A. Erskine, consulting engineer, of Morgantown, W. Va., has joined the organization of the Pennsylvania Coal Co., at Scranton, Pa., as consulting electrical and mechanical engineer.

Rice Miller, general manager of the Hillsboro Coal Co.; George F. Campbell, assistant to the president, Old Ben Coal Corporation, and L. D. Smith, vice-president, Chicago, Wilmington & Franklin Coal Co., have been appointed to the Mining Investigation Commission of Illinois by Governor Emmerson.

J. W. Searles, president of the Pennsylvania Coal & Coke Corporation, has been appointed a member of the executive committee of the National Coal Association by President E. C. Mahan, to fill the vacancy caused by the death of the late S. Pemberton Hutchinson, president of the Westmoreland Coal Co.

E. B. Agee, formerly superintendent of Continental No. 1 mine of the H. C. Frick Coke Co., Uniontown, Pa., is now superintendent of the Youngstown Sheet & Tube Co.'s mine at Dehue, in Logan County, W. Va. He succeeded J. J. Fluck, who has gone into consulting engineering work.

William F. Oakes, president of the Sunnyside Coal Co., Denver, Colo., for the last 25 years, has tendered his resignation so that he may look after the oil interests of his late son-in-law, Ralph Antonides. Mr. Oakes was relieved at the Sunnyside company by Mrs. Ellen Terry Robinson, widow of William P. Robinson, chairman of the Moffat tunnel commission.

Frank H. Wagner, of Hazleton, Pa., became general manager of the Lehigh Valley Coal Co., Wilkes-Barre, Pa., on March 1. Mr. Wagner succeeds Thomas P. Thomas, who has been assigned to "special duties." The new general manager joined the company in 1913.

A. C. Schafer, formerly foreman at Mine No. 32 of the Consolidation Coal Co., Owings, W. Va., has been appointed superintendent of mines Nos. 210-215, at McRoberts, Ky. He succeeds L. L. Murdock, resigned.

Rechristened

The Philadelphia & Reading Coal & Iron Co. has changed the names of its sizes of domestic anthracite hitherto known as "egg" and "pea" to "furnace" and "firewell," respectively.

Mining Institute Sessions In Seattle Well Attended

Registration of 120 persons and an average attendance of 50 marked the sessions of the Mining Institute of the College of Mines, University of Washington, Seattle, Wash., held during the week of Jan. 21 to 26. In addition to those registered for courses in the daytime, many others attended the illustrated lectures in the evenings.

The program consisted of lectures by members of the faculty of the College of Mines and by outside engineers. Laboratory demonstrations, a program of motion pictures, a trip to the Tacoma smelter, a luncheon given by the students' Mining Society and a joint session with the North Pacific Section of the American Institute of Mining and Metallurgical Engineers supplemented the formal lectures. Among the special speakers and the subjects of their addresses were: George Watkin Evans, consulting engineer, Seattle, "The Coal Fields of the Pacific Slope"; Ward Royce, Ingersoll-Rand Co., Seattle, "Equipment for a Small Mine"; R. E. Murphy, duPont Co., Seattle, "The Use of Explosives in Mining Operations"; W. D. Shannon, Northwest manager, Stone & Webster Corporation, Seattle, "Steam-Generated Power vs. Hydro-Electric Power Development"; R. P. Leonard, Gardner-Denver Co., Seattle, "Rock Drilling"; R. F. Yancey, Northwest Experiment Station, U. S. Bureau of Mines, "The Work of the U. S. Bureau of Mines"; John Schoning, U. S. Bureau of Mines, "First-Aid and Rescue Methods in Mining."

Members of the staff of the College of Mines lectured on the following topics: Prof. Joseph Daniels, "Recent Developments in Low-Temperature Carbonization Processes and Improved Methods of Utilization of Coal"; Dean Henry Landes, "Geological Aspects of Prospecting for Coal."

Operators Appoint Committee To Curtail "No Bill" Evil

In the effort to eliminate the practice of holding "no bill" coal loads on mine tracks and mine sidings for excessive periods free of demurrage representatives of the National Coal Association have been conferring with members of the committee on car service of the American Railway Association, at the request of the latter. A representative of the car service division said that unless the coal industry and the railroads can, through co-operative action, work out a solution tending to eliminate the abuses which have crept in under the distribution rules now in effect the railroads will be under the necessity of applying demurrage at mines and mine sidings.

M. J. Gormley, chairman, and W. J. McGarry, manager of the car service division of the railway association, presented figures on cars held from 10 to more than 30 days, which the car service committee suggested be used in working out a remedy against excessive delays. H. F. Gandy, executive secretary, and John Battle, traffic manager, who represented the National Coal Association in the conference, advised Messrs. Gormley and McGarry that the trade practice section of the association had been directed to make a study of the open-consignment problem and that further contact would be had with the car service division.

The National Coal Association has appointed the following committee to give consideration to questions arising out of holding "no bill" coal on cars at the mines and the sending of coal to market on open consignment:

J. D. Francis (chairman), vice-president, Island Creek Coal Co., Huntington, W. Va.; George J. Anderson, president, Consolidation Coal Co., New York City; Judge Wm. S. Bennet, general counsel, Edward Hines Associated Lumber Interests (Continental Coal Company), Chicago; J. G. Bradley, president, Elk River Coal & Lumber Co., Dundon, W. Va.; M. W. Bush, president, Alabama By-Products Corporation, Birmingham, Ala.; William Collins, vice-president, M. A. Hanna Co., Cleveland, Ohio; George B. Harrington, president, Chicago, Wilmington & Franklin Coal Co., Chicago; George McCall, vice-president, Westmoreland Coal Co., Philadelphia, Pa.; W. J. Jenkins, president, Consolidated Coal Co. of St. Louis, St. Louis, Mo.; Charles A. Owen, president, Imperial Coal Corporation, New York City; C. F. Richardson, president, West Kentucky Coal Co., Sturgis, Ky.; John A. Sargent, vice-president, Central Coal & Coke Co., Kansas City, Mo.; A. B. Sheets, president, Hillman Coal & Coke Co., Pittsburgh, Pa.; John A. Templeton, president, Templeton Coal Co., Terre Haute, Ind.; John H. Tonkin, general manager, Independent Coal & Coke Co., Salt Lake City, Utah; R. C. Tway, president, R. C. Tway Coal Co., Louisville, Ky.; H. Van Mater, president, Royal Fuel Co., Denver, Colo., and L. E. Woods, president, Central Pocahontas Coal Co., Welch, W. Va.

To Rebuild Humbert Breaker

Decision has been reached to rebuild the breaker of the Humbert Coal Co. at Jessup, Pa., which was destroyed by fire recently at a loss of nearly $100,000. Until the new breaker has been erected the company proposes to make arrangements whereby its coal can be prepared for market at another breaker in the Jessup region.

Urges Kentucky Short Line

The Louisville & Nashville R.R. has applied to the Interstate Commerce Commission for authority to construct eight miles of new line between Fox Ridge and Straight Creek, in Bell County, Kentucky, to serve a timber and coal territory.

Accidents at Coal Mines in January Cause Loss of 177 Lives

Accidents at coal mines in the United States during the month of January, 1929, caused the loss of 177 lives, according to information received from state mine inspectors by the U. S. Bureau of Mines. One hundred and thirty-nine of these fatalities occurred in bituminous mines in various states and the remaining 38 in the anthracite mines of Pennsylvania.

The output of bituminous coal during the month was 51,456,000 tons, while that for anthracite was 7,337,000 tons. Based on these figures the fatality rate for bituminous coal was 2.70 per million tons of coal produced; the anthracite rate was 5.18, and the total was 3.01. For the same month in 1928 the bituminous rate was 3.17, based on 140 deaths and 44,208,000 tons; anthracite, 4.92, based on 28 fatalities and 5,690,000 tons, and the rate for both bituminous and anthracite was 3.37, based on 168 fatalities and a total production of 49,898,000 tons. Compared with the month of December, 1928, the rates for the present month were lower both for bituminous and anthracite mines.

One major disaster—that is, one in which five or more lives are lost—occurred during January, 1929. This was an explosion at Kingston, W. Va., on Jan. 26, which caused the death of 14 men. Only one such disaster occurred in January a year ago, when 21 men lost their lives in an explosion at West Frankfort, Ill., on Jan. 9.

Figures recently compiled for the calendar year 1928 show a total of 2,171 deaths from accidents at all coal mines in the United States. Of this number 1,724 were in bituminous mines and 447 in anthracite mines. The production of coal for 1928 is estimated at 492,755,000 tons of bituminous and 76,734,000 tons of anthracite, thus showing a fatality rate per million tons of coal mined of 3.50 for bituminous and 5.83 for anthracite, with a total of 3.81 for the entire industry. The figures for 1928, when compared with those for 1927, indicate a slight increase in the death rate for bituminous mines and for the coal industry as a whole.

A comparison of the principal causes of accidents in January, 1929, with those for the same month last year shows lower accident rates per million tons for falls of roof and coal, and gas or dust explosions; the rates for electricity were practically the same; a slight increase shows for both haulage and explosives.

The following figures show the death rate per million tons, by principal causes, for the years 1927 and 1928 and for January, 1928, and January, 1929:

	Year 1927	Year 1928	Jan., 1928	Jan., 1929
All causes	3.732	3.812	3.367	3.011
Falls of roof and coal	1.922	1.868	1.844	1.514
Haulage	.594	.632	.461	.562
Gas or dust explosions:				
Local explosions	.154	.088	.060	.136
Major	.259	.572	.421	.238
Explosives	.184	.130	.080	.153
Electricity	.167	.155	.120	.119
Other causes	.452	.367	.381	.289

"Keep On Keeping On"

W. B. Hillhouse, chief mine inspector of Alabama, according to a special bulletin of the Alabama Council of the Joseph A. Holmes Safety Association, recently advised Governor Bibb Graves of that state:

"There is no doubt that first-aid training creates a safety-first habit and the state should encourage and back up this work. Have I your permission to issue certificates under the seal of the State of Alabama to all men who pass successful examination in first-aid and mine-rescue training as given by the U. S. Bureau of Mines in co-operation with the state mine inspection department?"

The Governor's reply was: "Keep on keeping on."

Buffalo-Thacker Co. Sold

The properties and assets of the Buffalo-Thacker Coal Co., in the Williamson field of West Virginia, were sold on Feb. 7 for the benefit of creditors. Representatives of the Cortiga Development Co., of Philadelphia, Pa., already a large owner of Mingo County real estate, submitted a bid of $26,500 for the tipple, plant, equipment and tenements of the coal company, including a tract of 176 acres on which the main portion of the plant is located. The total indebtedness of the company is $645,100.26.

Coal-Mine Fatalities During January 1929, by Causes and States

(Compiled by Bureau of Mines and published by *Coal Age*)

State	Underground												Shaft					Surface							Total by States	
	Falls of roof (coal, rock, etc.)	Falls of face or pillar coal.	Mine cars and locomotives.	Explosions of Gas or Coal Dust	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining Machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes	Railway cars and locomotives.	Other causes	Total.	1929	1928
Alabama	4	....	....	1	....	....	1	....	....	....	....	6	....	....	....	....	....	1	....	....	....	....	....	1	7	4
Alaska	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Arkansas	1	....	....	....	1	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2	4
Colorado	3	1	1	....	....	....	....	....	....	....	....	5	....	....	....	....	....	....	....	....	....	....	....	....	5	2
Illinois	1	1	6	....	1	....	....	....	....	....	....	9	....	....	....	....	....	....	....	....	....	....	....	....	9	31
Indiana	1	....	1	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2	5
Iowa	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Kansas	1	....	....	....	1	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2	0
Kentucky	9	....	3	2	....	....	1	....	....	....	....	15	....	....	....	....	....	....	....	....	....	....	....	....	15	12
Maryland	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Michigan	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Missouri	....	1	....	....	....	....	1	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2	0
Montana	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	1
New Mexico	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	2
North Dakota	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	1	1
Ohio	6	....	1	....	....	....	1	....	....	....	....	8	....	....	....	....	....	....	....	....	....	....	....	....	8	5
Oklahoma	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	2
Pennsylvania (bituminous)	12	4	6	....	1	....	....	....	3	....	....	26	....	....	....	....	....	....	....	....	....	....	....	....	26	30
Tennessee	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	1
Texas	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	0
Utah	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	2
Virginia	....	1	2	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	3	4
Washington	2	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2	0
West Virginia	16	2	9	16	2	....	1	....	3	....	1	50	....	....	....	....	....	....	....	....	....	1	1	2	52	32
Wyoming	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	2
Total (bituminous)	59	10	29	19	6	....	5	....	6	....	1	135	....	....	....	....	....	1	....	1	....	1	1	4	139	140
Pennsylvania (anthracite)	15	5	4	3	3	1	2	....	....	....	1	34	....	....	....	....	....	3	....	....	....	....	1	4	38	28
Total, January, 1929	74	15	33	22	9	1	7	....	6	....	2	169	....	....	....	....	....	4	....	1	....	1	2	8	177	....
Total, January, 1928	74	18	23	24	4	....	6	1	....	....	5	155	....	1	2	....	3	3	....	2	....	2	3	10	....	168

Among the M*anufacturers*

THE JEFFREY MFG. Co., Columbus, Ohio, has bought the entire capital stock of the Galion Iron Works & Mfg. Co., Galion, Ohio, maker of road machinery and equipment and which recently developed elevating and conveying equipment for handling coal, stone, gravel and other materials. The new officers of the Galion company are D. C. Boyd, chairman of the board; Robert W. Gillispie, who is vice-president and general manager of the Jeffrey company, president and general manager; J. S. Boyd, vice-president, and F. W. Faber, secretary-treasurer.

* * *

R. F. CREGO, formerly sales manager of the L. C. Smith Bearing Co., Chicago, has joined the sales organization of the Foote Bros. Gear & Machine Co., Chicago. The Eastern branch office of the Foote company is in the Transportation Building, New York City, instead of the Woolworth Building, as the company recently announced.

* * *

ARTHUR W. STEED has been appointed superintendent of the maintenance department of the Middletown (Ohio) plant of the American Rolling Mill Co.

* * *

H. B. GUEST, formerly in the Birmingham (Ala.) office of the American Cast Iron Pipe Co., has been transferred to the Chicago office, and F. W. McMeans, formerly at Chicago, will make his headquarters in Detroit, Mich.

* * *

THE MINE SAFETY APPLIANCES Co., Pittsburgh, Pa., has appointed Vernon O. Murray as district representative at Salt Lake City, Utah, and C. N. Schultz as district representative at Buffalo, N. Y., where he succeeds C. M. Donahue, who has been transferred to the Pittsburgh office as assistant sales manager in charge of gas detecting and recording safety equipment.

* * *

C. A. REED has resigned as Pittsburgh district sales manager of the Erie City Iron Works, Erie, Pa., to become chief combustion engineer of the Pittsburgh Coal Co., Pittsburgh, Pa., in charge of servicing on coal sales. Mr. Reed was with the International Combustion Engineering Corporation, New York City, for eight years prior to joining the Erie City Iron Works two years ago.

EDWIN J. MOHR has been elected president of the Gould Storage Battery Co., Inc., Depew, N. Y., succeeding Kenneth M. Smith, who resigned to become associated with the Horace E. Dodge Boat Works. Mr. Mohr was previously manager of production for the Gould Coupler Co. and the Symington Co.

* * *

THE PREST-O-LITE Co., INC., has acquired the business of the Acetylene Products Co., which operated two acetylene producing plants located at 401 E. Buchanan Street, Phoenix, Ariz., and at 914 Texas Street, El Paso, Texas. These plants are now being operated as units of the Prest-O-Lite chain. Everett R. Kirkland is superintendent of the Phoenix plant, and Carl F. Chesak is superintendent of the El Paso plant. R. G. Daggett, whose headquarters are at the San Francisco office, is district superintendent.

* * *

CUTLER-HAMMER, INC., Milwaukee, Wis., has acquired the business of the Trumbull Vanderpoel Electric Manufacturing Co., of Bantam, Conn., which will be operated as a subsidiary under its present name. The Atlanta office of Cutler-Hammer occupies new quarters at 150 Peters St., S. W.

* * *

THE LINCOLN ELECTRIC Co., Cleveland, Ohio, has appointed C. M. Taylor as sales manager.

* * *

C. F. PEASE Co., Chicago, has established a new Pacific Coast sales office at 501 South Spring Street, Los Angeles, Calif., under the direction of Ralph S. Gibson, Western sales manager.

* * *

H. A. BAKER, of Schenectady, N. Y., has been appointed as service manager of the International General Electric Co., with headquarters in New York City. He succeeds C. F. Neave, who has been named manager of the newly organized refrigeration department of the company.

* * *

THE AMERICAN HOIST & DERRICK Co., St. Paul, Minn., has appointed F. E. Bauer, Jr., as export sales manager with offices at 50 Church Street, New York City. The company also has opened a branch office at 139 Townsend Street, San Francisco, Calif., with Boyd Nixon in charge.

A closer union of the Hillman enterprises—the A. M. Byers Co., Spang, Chalfant & Co., Inc., and the Oil Well Supply Investment Co.—is being effected through the formation of Pennsylvania Industries, Inc. A banking group headed by Dillon, Read & Co. has offered stock of the new company, which will be headed by J. H. Hillman, Jr., as chairman.

* * *

C. M. GARLAND & Co. and John A. Scribbins have incorporated under the name of Garland & Scribbins, and will continue their lines of consultation, design, supervision and construction with offices at 1163 First National Bank Building, Chicago, Ill.

* * *

THE READING IRON Co., Reading, Pa., has established a new district sales office at 1216 Hibernia Bank Building, New Orleans, La., under the direction of George E. Tyson.

* * *

B. E. SCHONTHAL & Co., INC., Chicago, has been appointed district sales agent for the Mines Equipment Co., of St. Louis, Mo.

* * *

THE FOLLOWING WESTERN agents were recently appointed by the National Flue Cleaner Co., Inc., of Groveville, N. J.: McGee Sales Agency, 75 Fremont St., San Francisco, Calif.; Flickinger, Meyers & Rudolph, 129 W. Second St., Los Angeles, Calif., and the Manufacturers Sales Service, Salt Lake City, Utah.

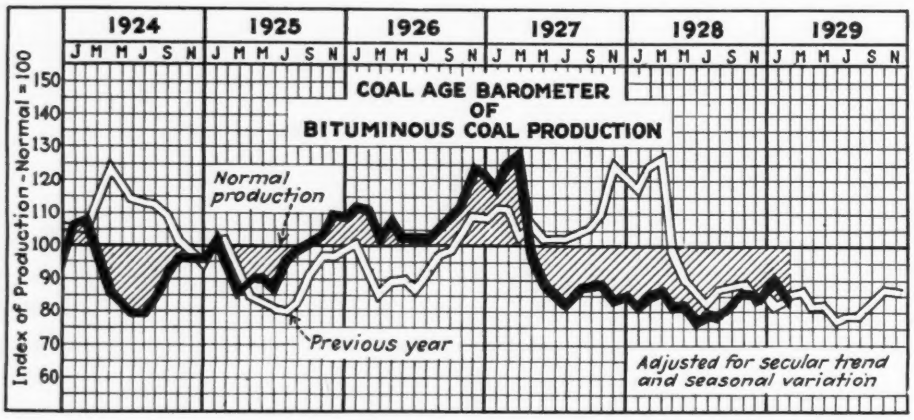
* * *

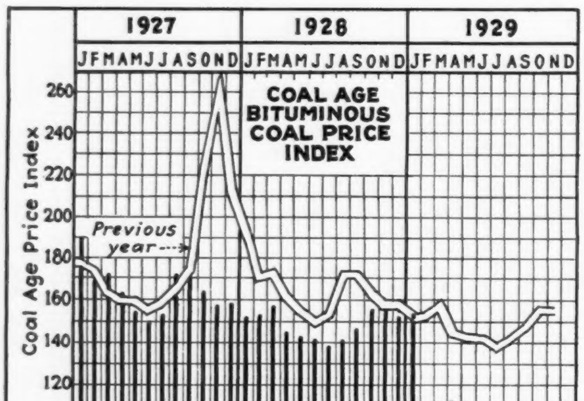
BOTFIELD REFRACTORIES Co., Philadelphia, Pa., announces that McCarthy-Jones & Allen Co., Inc., 111 First Avenue, South, Nashville, Tenn., will handle Botfield products.

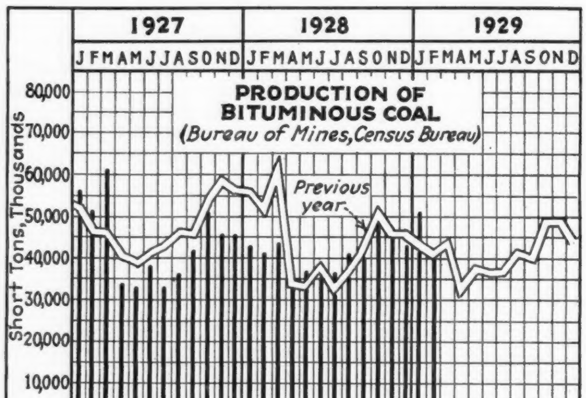
* * *

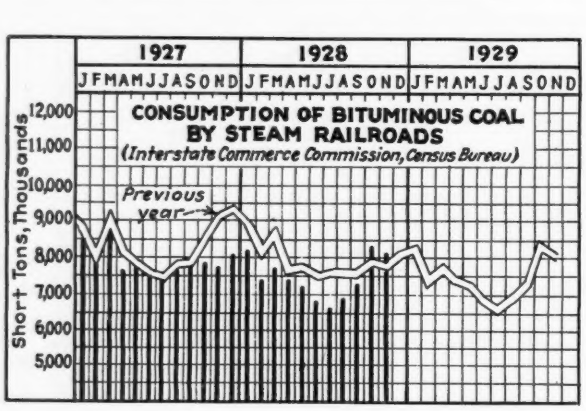
CONSOLIDATION of refractories manufacturers to be known as the North American Refractories Co. and to be headed by John D. Ramsay, president of the Elk Brick Co., St. Marys, Pa., has been effected. The new company will have fifteen plants with an annual capacity of 155,000,000 bricks. Included in the merger are the Ashland Fire Brick Co., Ashland, Ky.; Crescent Refractories Co., Curwensville, Pa.; Dover Fire Brick Co., Cleveland, Ohio; Elk Fire Brick Co., St. Marys, Pa.; Farber Fire Brick Co., Farber, Mo., and Queens Run Refractories Co., Inc., Lock Haven, Pa.

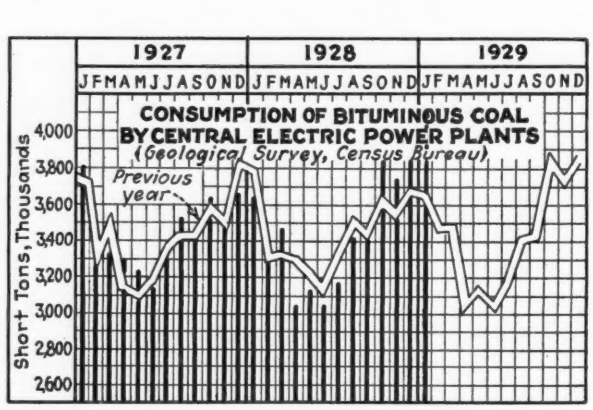
Indicators of Activities in the Coal Industry

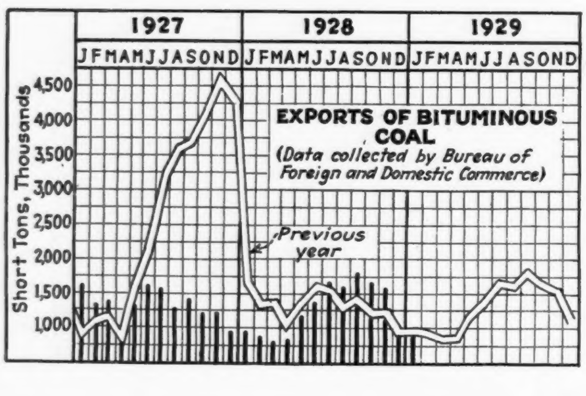


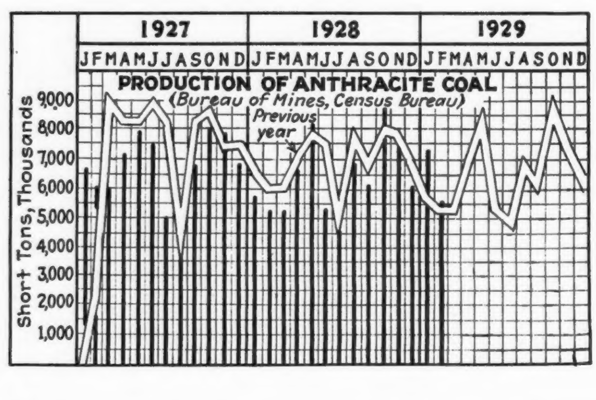












MARKETS

in Review

BITUMINOUS coal markets of the United States were especially favored by weather conditions during February, particularly in the first half of the month, so that not only was the demand for current requirements heavy but orders on hand kept tonnage moving in considerable volume even in the later weeks, when milder temperatures prevailed. Dock operators at the Head of the Lakes and producers in Kentucky and the Southwest had one of the liveliest months in recent years. Coals for heating purposes contined to be in most active demand, and this had the usual effect of creating a surplus of screenings in some districts. The net result, nevertheless, was a firmer general tone and a slightly higher level of prices.

Steam coals were comparatively quiet, reflecting the difference in buying habits and storage methods by industrial consumers as compared with householders. In this connection it is worthy of note that the latest commercial coal stock report of the U. S. Bureau of Mines estimates reserves on Jan. 1 at 41,800,000 net tons, a decline of 13,700,000 tons from the corresponding date a year ago and the lowest for any similar date since 1923. These figures when considered in relation to the healthy industrial situation and the fact that the opening of navigation on the lakes is not far off present a promising outlook. Shippers of lake tonnage are hopeful that the season will get under way earlier than last year.

Bituminous production last month, according to preliminary estimates of the U. S. Bureau of Mines, was 41,351,000 net tons, compared with the revised total for January of 51,456,000 tons. The average output per working day fell from 1,953,000 to 1,661,000 net tons. A year ago the output was the same.

Coal Age Index (preliminary) of spot bituminous prices in February was 154, compared with the revised January figure of 152½. By weeks the figures for February were: 156, Feb. 2; 154, Feb. 9, and 153, Feb. 16 and 23. The corresponding weighted average prices were \$1.89, \$1.87 and \$1.85. Revised figures for January were: 152, Jan. 5; 153, Jan. 12 and 19, and 152, Jan. 26. The corresponding weighted average prices were \$1.84, \$1.85 and \$1.84.

The movement of anthracite was steady and in good volume during February. Chestnut led in demand; stove was strong and egg made a good showing. Pea, though the slowest of the domestic sizes, improved its position. The steam sizes were notably strong. February output of anthracite was 5,582,000 net tons and the daily average was 228,000 tons, the same as a year ago. Efforts to repeal the anthracite tax are progressing favorably in the Pennsylvania Legislature.

A FORETASTE of spring weather toward the end of last month caused a thinning out of accumulated orders for domestic grades in the Chicago market. As dealers' stocks are low, however, there is not likely to be a rush of cancellations unless the mild weather is protracted. Meantime little new business is being placed. Egg orders were about cleaned up at the end of the month; bookings on lump were about sufficient for a week's run; No. 1 nut was slow at all the Midwest operations. Steam coals have become practically a drug on the market.

While screenings are weak and easy, with large storage piles at a number of Illinois mines and several hundred carloads unsold on track, nevertheless the undertone is firm. The impending reaction on domestic is expected to have a favorable effect.

SMOKELESS was the strongest of the Eastern coals entering the Chicago market. Producers were behind on lump, egg and stove and shipments on mine-run contracts were satisfactory; prices as a rule held steady. Better grade Eastern high volatiles also were firm, with numerous orders ahead on block and egg. Ordinary grades were somewhat slow. Anthracite demand was at the seasonal average; coke, however, showed a sharp increase.

Last month was the best in any coal year that St. Louis can remember. Considerably cold up until the last five days, domestic tonnage reached a high mark with dealers. Steam, however, trailed somewhat. County demand has been exceptionally good, with prices firm. Coke showed steady increases while Pennsylvania anthracite continued to lose and Eastern high volatiles to gain, with West Virginia low volatiles losing fast and Arkansas anthracite getting a foothold.

Dock operators at Duluth and Superior had one of the best months in their history in February, shipments for the month being estimated at 27,000 cars as against 22,804 in the same period a year ago. There was a shortage of smokeless coal, some docks being compelled to decline new business in order to be able to take care of shipments on standing contracts and others bringing up all-rail shipments. There has been

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Week Ended							
		February 2, 1929		February 9, 1929		February 16, 1929		February 23, 1929	
	Market Quoted	Independent	Company	Independent	Company	Independent	Company	Independent	Company
Broken	New York	....	\$8.25@\$8.50	....	\$8.25@\$8.50	....	\$8.25@\$8.50	....	\$8.25@\$8.50
Broken	Philadelphia	\$8.50@\$8.75	8.25	\$8.50@\$8.75	8.25	\$8.50@\$8.75	8.25	\$8.50@\$8.75	8.25
Egg	New York	8.60@ 8.75	8.75	8.60@ 8.75	8.75	8.50@ 8.75	8.75	8.50@ 8.75	8.75
Egg	Philadelphia	8.75@ 9.00	8.75	8.75@ 9.00	8.75	8.75@ 9.00	8.75	8.75@ 9.00	8.75
Egg	Chicago*	7.82	7.82	7.82	7.82	7.82	7.82	7.82	7.82
Stove	New York	9.10@ 9.25	9.25	9.15@ 9.25	9.25	9.15@ 9.25	9.25	9.05@ 9.25	9.25
Stove	Philadelphia	9.10@ 9.35	9.10	9.10@ 9.35	9.10	9.10@ 9.35	9.10	9.10@ 9.35	9.10
Stove	Chicago*	8.26	8.26	8.26	8.26	8.26	8.26	8.26	8.26
Chestnut	New York	8.65@ 8.75	8.75	8.65@ 8.75	8.75	8.65@ 8.75	8.75	8.60@ 8.75	8.75
Chestnut	Philadelphia	8.75@ 9.00	8.75	8.75@ 9.00	8.75	8.75@ 9.00	8.75	8.75@ 9.00	8.75
Chestnut	Chicago*	7.82	7.82	7.82	7.82	7.82	7.82	7.82	7.82
Pea	New York	4.55@ 5.00	5.00	4.50@ 5.00	5.00	4.50@ 5.00	5.00	4.50@ 5.00	5.00
Pea	Philadelphia	5.00@ 5.25	5.00	5.00@ 5.25	5.00	5.00@ 5.25	5.00	5.00@ 5.25	5.00
Pea	Chicago*	4.45	4.45	4.45	4.45	4.45	4.45	4.45	4.45
Buckwheat	New York	2.85@ 3.25	†3.00@ 3.25	3.00@ 3.25	†3.00@ 3.25	2.75@ 3.25	†3.00@ 3.25	2.60@ 3.25	†3.00@ 3.25
Buckwheat	Philadelphia	3.00@ 3.25	3.00	3.00@ 3.25	3.00	3.00@ 3.25	3.00	3.00@ 3.25	3.00
Rice	New York	1.75@ 2.00	2.25	1.75@ 2.00	2.25	1.75@ 2.00	2.25	1.60@ 2.00	2.25
Rice	Philadelphia	2.25@ 2.50	2.25	2.25@ 2.50	2.25	2.25@ 2.50	2.25	2.25@ 2.50	2.25
Barley	New York	1.40@ 1.70	1.70@ 1.75	1.40@ 1.70	1.70@ 1.75	1.40@ 1.70	1.70@ 1.75	1.35@ 1.70	1.70@ 1.75
Barley	Philadelphia	1.75@ 2.00	1.75	1.75@ 2.00	1.75	1.75@ 2.00	1.75	1.75@ 2.00	1.75

*Net tons, f.o.b. mines. †Domestic buckwheat, \$3.75 (D., L. & W.)

a notable broadening in the demand for domestic coke.

THE volume of tonnage moving off the docks during the past two months has effectively wiped out the bugbear of surplus stocks. In fact some observers think that the run of coal to the Head of the Lakes from Lake Erie ports during the coming season will reach about 9,400,000 tons of bituminous and 600,000 tons of anthracite. It is hoped that, in order to make this possible, the season will get under way earlier than last year, when the first shipment reached the docks on May 6.

More than six weeks of below-freezing temperatures in the Southwest — the longest cold spell in that area in years — resulted in the best coal trade for February that the district has had in a long time. Kansas City retailers reported 25 to 35 per cent increases in deliveries over a year ago. Operators fell a week behind on orders for prepared sizes, and while the increased production made supplies of screenings more plentiful they were only about equal to the demand. As the Kansas strip operators dug out from under the snow and ice the prices of shovel lump and nut lost the January advance of 25c., but other grades held firm and unchanged throughout the month.

Continued improvement marked the trade in Colorado and New Mexico in February, due to unabated cold weather. Operators are behind on orders for lump, with nut and slack lagging somewhat. The mines are operating full time, with no interruptions from labor or transportation difficulties. February mine quotations were: Walsenburg-Canon City lump, \$5.75; washed chestnut, \$4.75; fancy chestnut, \$3.25; Trinidad coking lump, \$3.75; lump-and-nut, \$3.50; fancy chestnut, \$3.25; Crested Butte large anthracite, \$9.50; brooder mixture, \$7.25; chestnut, \$5; northern Colorado 6-in. lignite lump, \$3; 2½-in., \$2.75; Rock Springs-Kemmerer lump, \$4.50; nut, \$3.75; steam coal, \$1.35.

Low temperatures with much snow kept Kentucky mines more than usually busy during February in meeting the demand for both steam and domestic sizes. Eastern Kentucky producers fell behind on deliveries, illness causing a labor shortage. This situation has been largely cleared up, however, and producing time is better in both the eastern and western fields of the state. Business slowed up somewhat toward the end of the month and prices softened, with the trade now looking toward the contracting season and the opening of lake shipping.

PRICES on prepared sizes slumped with the other grades near the month end, which found screenings at 45c. and up in both eastern and western Kentucky. According to some shippers, indications are that screenings will work up and that prepared sizes will ease to a top of about \$2@\$2.25 in the eastern field and \$1.75 in the western. Screenings, they say, should be at 75c.@\$1 or better before long, for when prepared shipments wane the mines will not have much surplus for the open market after taking care of contract shipments.

Frequent short spells of cold weather last month kept the Cincinnati trade steadily active in a few grades, interest in the rest being uniformly lacking. Prepared sizes had the call, smokeless egg and high-volatile lump and block taking the cream of the market. Stove improved with the heavy call for egg and a steady demand from retailers with screening facilities helped to keep mine-run on an even keel.

Screenings had a parlous time; active buying by byproduct plants gave promise for a time, but increasing demand for sized coals caused a sag toward the end of the month. Heavy production also softened high-volatile slack, so that the lower grades fell to 30c.@50c. Special grades held at 75c.@\$1, though even some high grades dropped to 50c.@60c. in the open market. High-volatile egg was even harder hit, some going on a mine-run basis and selling toward the month end as low as \$1.30@\$1.50.

DOMESTIC business was brisk in Columbus last month. Though dealers' orders were largely limited to current requirements buying was steady. Even with the abatement of low temperature toward the end of the month producers and wholesalers had orders ahead to keep them busy for a while. The steam trade, however, was dull. There was contract talk near the month end, with little of a definite character developing.

Prices were well maintained, some of the better known splints showing advances. Smokeless, however, was the most active, particularly egg, which in some instances sold higher than lump. Production in the Hocking Valley and Pomeroy Bend fields improved and more men were taken on. Little demurrage coal was in evidence.

Tonnage moved in good volume in the Cleveland market last month, but the appearance of cold weather early in the month brought too much fuel for the trade to absorb. When the temperature moderated in the latter half the market was glutted.

At Pittsburgh there was a constant demand for domestic coal during most of the last month, which kept the market in fair shape, except that prices were nothing to brag about. The tonnage moving showed heavier production in February than in the preceding month. Domestic demand declined toward the end of February, when furnace coke became prominent. Blast-furnace and heating demand sent the spot price to \$3.25, compared with a low level of \$2.60 last fall. Though industrial and railroad stocks are small, business from these sources was disappointing. The lake cargo situation is beginning to elicit interest, though what the coming season holds for this district is uncertain.

THE price situation showed firmness in domestic grades at \$2.40@\$2.60 with some lump bringing as high as \$2.75. It was much easier to get the higher figures than a month earlier. Heavy output of prepared caused a surplus of steam slack, which touched a low point of 65c.@70c. Demand was better for gas slack, which resisted the decline, though the two grades usually sell within 10c. of each other.

Current Quotations—Spot Prices, Bituminous Coal, Net Tons, F.O.B. Mines

LOW-VOLATILE, EASTERN	Market Quoted	Week Ended Feb. 2, 1929	Feb. 9, 1929	Feb. 16, 1929	Feb. 23, 1929
Smokeless lump	Columbus	\$3.00@\$3.35	\$3.00@\$3.25	\$3.00@\$3.25	\$3.00@\$3.35
Smokeless mine-run	Columbus	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.10
Smokeless screenings	Columbus	.85@ 1.10	.85@ 1.00	.85@ 1.00	.75@ 1.00
Smokeless lump	Chicago	3.00@ 3.75	3.00@ 3.75	2.75@ 3.75	2.75@ 3.75
Smokeless mine-run	Chicago	2.15@ 2.25	2.15@ 2.25	1.85@ 2.25	1.85@ 2.25
Smokeless lump	Cincinnati	3.00@ 3.75	2.75@ 3.75	2.75@ 3.75	3.00@ 3.50
Smokeless mine-run	Cincinnati	2.10@ 2.25	2.25	2.25	2.25
Smokeless screenings	Cincinnati	.85@ 1.25	1.00@ 1.25	1.00@ 1.25	.75@ 1.25
*Smokeless mine-run	Boston	4.35@ 4.50	4.40@ 4.50	4.35@ 4.50	4.30@ 4.45
Clearfield mine-run	Boston	1.60@ 1.95	1.60@ 1.90	1.60@ 1.90	1.60@ 1.90
Cambria mine-run	Boston	1.85@ 2.10	1.80@ 2.10	1.80@ 2.10	1.80@ 2.10
Somerset mine-run	Boston	1.70@ 2.00	1.70@ 2.00	1.70@ 2.00	1.70@ 2.00
Pool 1 (Navy Standard)	New York	2.36@ 2.65	2.35@ 2.65	2.35@ 2.65	2.35@ 2.65
Pool 1 (Navy Standard)	Philadelphia	2.30@ 2.65	2.30@ 2.65	2.30@ 2.65	2.30@ 2.65
Pool 9 (super. low vol.)	New York	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Pool 9 (super. low vol.)	Philadelphia	1.80@ 2.15	1.80@ 2.15	1.80@ 2.15	1.80@ 2.15
Pool 10 (h. gr. low vol.)	New York	1.65@ 1.80	1.65@ 1.80	1.65@ 1.80	1.65@ 1.80
Pool 10 (h. gr. low vol.)	Philadelphia	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80
Pool 11 (low vol.)	New York	1.50@ 1.60	1.50@ 1.60	1.50@ 1.60	1.50@ 1.60
Pool 11 (low vol.)	Philadelphia	1.40@ 1.65	1.40@ 1.65	1.40@ 1.65	1.40@ 1.65
HIGH-VOLATILE, EASTERN					
Pool 54-64 (gas and st.)	New York	\$1.25@\$1.40	\$1.25@\$1.40	\$1.25@\$1.40	\$1.25@\$1.40
Pool 54-64 (gas and st.)	Philadelphia	1.25@ 1.40	1.25@ 1.40	1.25@ 1.40	1.25@ 1.40
Pittsburgh sc'd gas	Pittsburgh	1.90@ 2.10	1.90@ 2.10	1.90@ 2.10	1.90@ 2.00
Pittsburgh gas mine-run	Pittsburgh	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75
Pittsburgh mine-run	Pittsburgh	1.50@ 1.75	1.50@ 1.75	1.40@ 1.75	1.40@ 1.75
Pittsburgh slack	Pittsburgh	.90@ 1.05	.90@ 1.00	.90@ 1.00	.80@ 1.00
Kanawha lump	Columbus	1.75@ 2.10	1.75@ 2.00	1.75@ 2.15	1.75@ 2.10
Kanawha mine-run	Columbus	1.25@ 1.60	1.25@ 1.60	1.25@ 1.60	1.25@ 1.55
Kanawha screenings	Columbus	.75@ .90	.70@ .90	.65@ .80	.50@ .75
W. Va. lump	Cincinnati	2.00@ 3.00	2.00@ 3.00	2.00@ 3.25	2.00@ 3.00
W. Va. gas mine-run	Cincinnati	1.40@ 1.60	1.40@ 1.60	1.40@ 1.60	1.35@ 1.60
W. Va. steam mine-run	Cincinnati	1.15@ 1.40	1.15@ 1.40	1.15@ 1.40	1.15@ 1.35
W. Va. screenings	Cincinnati	.50@ 1.00	.65@ 1.00	.50@ 1.00	.25@ 1.00
Hocking lump	Columbus	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.10
Hocking mine-run	Columbus	1.35@ 1.60	1.30@ 1.60	1.30@ 1.65	1.35@ 1.60
Hocking screenings	Columbus	.80@ .95	.75@ .85	.70@ .85	.70@ .85
Pitts. No. 8 lump	Cleveland	1.70@ 2.00	1.70@ 2.00	1.70@ 2.00	1.70@ 2.00
Pitts. No. 8 mine-run	Cleveland	1.35@ 1.50	1.30@ 1.40	1.35@ 1.40	1.30@ 1.40
Pitts. No. 8 screenings	Cleveland	.70@ .90	.70@ .90	.70@ .90	.70@ .90

* Gross tons, f.o.b. vessel, Hampton Roads.

Early promise in the central Pennsylvania region was not quite realized; the trade eased somewhat about the middle of the month and held fairly even to the close. Production averaged close to 16,000 cars per week and prices showed little change.

THE steam coal market in New England lost some of the firmness that prevailed during most of February. For more than a fortnight $5.25 was the ruling basis for nut-and-slack on cars Boston for inland delivery, with first-grade spot smokeless mine-run commanding $5.75. Late in the month prices began to ease, and stoker coal of the same grade was offered freely at $5.10 or less. Similarly, mine-run could be had for $5.60. This was partly the result of lessened demand, but chiefly it was due to new factors in the spot market. The canvass for season contracts is being conducted quietly, but it is apparent that most buyers will place requirements through accustomed channels.

At Hampton Roads there have been occasional shortages of nut-and-slack and mine-run. Quotations therefore were rather firmer than the Boston situation might indicate, although there was a margin of difference between coal on hand at the piers and coal that has yet to be ordered down from the region. For the latter $3.85 was asked for stoker coal and $4.25@$4.35 for mine-run of first grade. Prompt coal, however, brings $4.35@$4.50, and there was some trading between shippers at even higher figures to clear boats. The oncoming season is reflected also in lower coastwise freight rates.

AT New York bituminous coal was in fair demand throughout February. Low stocks resulted in steady buying of spot coals but there were no price changes. Contract making for the new coal year was one of the matters uppermost in the minds of producers. Old-time houses said they were closing up the usual tonnage at last year's prices, while other sellers said that many industrial plants were hesitating as to the advisability of depending upon the open market for their supply. It was believed that such contracts, if made, would be from 10 to 15c. below last year's figures.

From the standpoint of tonnage at least February was a satisfactory month in the Philadelphia market; volume alone has lessened the complaint about low prices. High-grade fuels have been in best demand, with prompt delivery urged by consumers without contracts. This is taken as a hopeful sign with the contracting season approaching. Another favorable factor is the low state of reserve piles.

Demand for all grades of domestic coal at Birmingham on the average was good for the entire month of February. Active buying during the oft recurring cold spells enabled most operators to accumulate sufficient orders to tide them over the warm periods, and all in all they had an unusually good month in so far as disposition of domestic production was concerned. Consumers bought more liberally of medium and lower grades than for some time, this course being conceded as largely due to economic conditions. Dealers were careful not to accumulate unnecessary stocks on account of the close of the coal year being near when spring schedule will be made effective. Quotations were unchanged on lump and other sizes, being rather more stabilized for the medium and lower quality fuels.

The steam coal market showed no material improvement in so far as general industrial demand was a factor. Inquiry and bookings of spot were light and the volume of new business taken on represented very little increase over January. The railroads increased weekly quotas to some extent with the reduction of reserves to normal proportions. Due to a more active demand for coke in the northwest byproduct coal consumption was heavier than for the previous month. Mine prices remained within range of the January quotations.

The anthracite market at New York was active during February, although the tonnage moved was not as large as in January. At times producers were short of individual coals, principally chestnut. Egg moved better than stove. Pea was the slowest mover of the domestic sizes. At times there were many loaded boats in the harbor awaiting buyers. Steam coals improved their position considerably, the best grades of No. 1 buckwheat being out of the market at times.

ALTHOUGH the weather in Philadelphia last month was not unusually severe consumer demand was active, and as purchases kept pretty close step with requirements it is thought likely that buying will be fairly steady to the end of the season. Chestnut continues to be most sought; stove eased off a little but made a good showing; pea bettered its position. The steam sizes held up in good style; buckwheat was strong throughout the month, while rice and barley displayed fair strength until toward the month end, when they wavered with the appearance of mild weather.

EXPORTS of bituminous coal from the United States during January—the latest month for which figures are available—were 917,118 gross tons, as compared with 1,093,495 tons in the preceding month and 851,536 tons in January, 1928. Anthracite exports in the first month of the present year were 297,849 gross tons, against 258,637 tons in December and 231,507 tons in January, 1928. Coke exports—103,898 gross tons—compare with 97,996 tons in the preceding month and 64,653 tons in January a year ago.

Canada, as usual, was the biggest customer of the American export coal trade. In January the Dominion was the consignee of 726,144 tons of bituminous coal. Cuba was second with 65,131 tons, Panama third with 37,538 tons and British West Indies and Bermuda fourth with 22,985 tons.

Imports for the same month were 48,846 gross tons of anthracite, 45,913 tons of bituminous and 8,502 tons of coke. The January, 1928, figures were 17,083 tons of anthracite, 50,618 tons of bituminous and 13,207 tons of coke. In January of this year the United States imported 6,618 tons of bituminous coal from the United Kingdom and 36,751 tons from Canada.

Current Quotations—Spot Prices, Bituminous Coal, Net Tons, F.O.B. Mines

		Week Ended			
MIDDLE WEST	Market Quoted	Feb. 2, 1929	Feb. 9, 1929	Feb. 16, 1929	Feb. 23, 1929
Franklin, Ill. lump	Chicago	$2.85@$3.00	$2.85@$3.00	$2.85@$3.00	$2.85@$3.00
Franklin, Ill. mine-run	Chicago	2.15@ 2.25	2.15@ 2.25	2.15@ 2.25	2.15@ 2.25
Franklin, Ill. screenings	Chicago	1.30@ 1.60	1.25@ 1.60	1.10@ 1.60	1.10@ 1.60
Central, Ill. lump	Chicago	2.40@ 2.65	2.40@ 2.65	2.40@ 2.65	2.40@ 2.65
Central, Ill. mine-run	Chicago	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Central, Ill. screenings	Chicago	.85@ 1.10	.85@ 1.10	.85@ 1.10	.85@ 1.10
Ind. 4th Vein lump	Chicago	2.50@ 3.00	2.50@ 3.00	2.50@ 3.00	2.50@ 3.00
Ind. 4th Vein mine-run	Chicago	1.50@ 2.25	1.50@ 2.25	1.50@ 2.25	1.50@ 2.25
Ind. 4th Vein screenings	Chicago	1.25@ 1.65	1.40@ 1.65	1.10@ 1.60	1.10@ 1.60
Ind. 5th Vein lump	Chicago	2.10@ 2.50	2.10@ 2.50	2.10@ 2.50	2.10@ 2.50
Ind. 5th Vein mine-run	Chicago	1.25@ 1.90	1.25@ 1.90	1.25@ 1.90	1.25@ 1.90
Ind. 5th Vein screenings	Chicago	.90@ 1.10	.95@ 1.10	.75@ 1.00	.75@ 1.00
Mount Olive lump	St. Louis	2.35	2.35	2.35	2.35
Mount Olive mine-run	St. Louis	2.00	2.00	2.00	2.00
Mount Olive screenings	St. Louis	1.10	1.00	1.00	1.00
Standard lump	St. Louis	2.15	2.15	2.10	2.00
Standard mine-run	St. Louis	1.50	1.50	1.50	1.50
Standard screenings	St. Louis	.65	.60	.55	.45
West Ky. block	Louisville	1.75@ 2.25	1.75@ 2.25	1.75@ 2.25	1.75@ 2.25
West Ky. mine-run	Louisville	1.35@ 1.75	.90@ 1.25	.90@ 1.40	.90@ 1.40
West Ky. screenings	Louisville	.60@ 1.20	.75@ .85	.65@ .90	.55@ .85
West Ky. block	Chicago	1.85@ 2.00	1.85@ 2.00	1.85@ 2.00	2.00@ 2.25
West Ky. mine-run	Chicago	.90@ 1.25	.90@ 1.25	.90@ 1.25	1.00@ 1.40
SOUTH AND SOUTHWEST					
Big Seam lump	Birmingham	$2.25@$2.75	$2.25@$2.75	$2.25@$2.75	$2.25@$2.75
Big Seam mine-run	Birmingham	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50
Big Seam (washed)	Birmingham	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
S. E. Ky. block	Chicago	2.00@ 2.75	2.00@ 2.75	2.50@ 3.00	2.50@ 3.00
S E. Ky. mine-run	Chicago	1.40@ 1.60	1.40@ 1.60	1.40@ 1.65	1.40@ 1.65
S. E. Ky. block	Louisville	2.50@ 3.00	2.50@ 3.00	2.50@ 3.25	2.25@ 3.00
S. E. Ky. mine-run	Louisville	1.35@ 1.75	1.35@ 1.75	1.35@ 1.75	1.35@ 1.75
S. E. Ky. screenings	Louisville	.60@ 1.20	.60@ 1.20	.60@ 1.20	.55@ 1.20
S. E. Ky. block	Cincinnati	2.25@ 3.00	2.25@ 3.00	2.25@ 3.25	2.25@ 3.00
S. E. Ky. mine-run	Cincinnati	1.15@ 1.65	1.15@ 1.65	1.15@ 1.65	1.15@ 1.65
S. E. Ky. screenings	Cincinnati	.50@ 1.00	.65@ 1.00	.50@ 1.00	.25@ 1.00
Kansas shaft lump	Kansas City	3.50@ 4.50	3.50@ 4.50	3.50@ 4.50	3.50@ 4.50
Kansas strip lump	Kansas City	3.25@ 3.50	3.00@ 3.25	3.00@ 3.25	3.00@ 3.25
Kansas mine-run	Kansas City	2.75	2.75	2.75	2.75
Kansas screenings	Kansas City	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75

WHAT'S NEW

In Coal-Mining Equipment

Car Spotter Eliminates Hand Labor

The spotting or placing of cars at a certain point for the loading or unloading of material is of interest to every plant having railway sidings or private tracks. In order to avoid the use of the labor gang with pinch bars, the use of a switch engine or other unsatisfactory devices, the Foote Bros. Gear & Machine Co., Chicago, offers the "Hygrade" car spotter. This machine, according to the manufacturers, is a compact, easily operated unit requiring only one operator to quickly place one or a string of cars in a fraction of the time ordinarily consumed. It is made in two sizes with rope pulls of 3,000 and 6,000 lb.

Moves the Cars and Saves the Back

New Products Control Boiler Operation

Among the new products recently announced by the Hays Corporation is a combustion meter—model "C"—and a boiler panel for mounting Hays instruments. The combustion meter is a highly refined machine, according to the manufacturers, and can be furnished to record CO_2 in combination with either furnace draft or flue-gas temperature or as a combined recorder for CO_2, draft and flue-gas temperature. The Orsat principle of operation has been retained and the changes have been made to refine the recording parts. The most sensitive range of the instrument gives a pen movement of $2\frac{1}{2}$ in. with a draft of 0.2 in. of water.

The boiler panel is U-shaped and made of $\frac{1}{4}$-in. steel boiler plate with a metal inclosure for the top and hinged steel doors at the rear. The valves, pipes and wiring for the several instruments are conveniently accessible through these doors and yet are completely protected and concealed from view. Slate fronts can be used instead of steel if desired.

Undervoltage Devices for Time-Interval Operation

To meet the demand for a device to protect against failure of voltage in power circuits after a suitable interval has elapsed, the General Electric Co. has introduced two new equipments bearing the designations MG-2 and PF-2. These are especially designed to trip the breaker in the circuit only after a suitable time interval, and will not cause interruptions to service when momentary voltage dips occur.

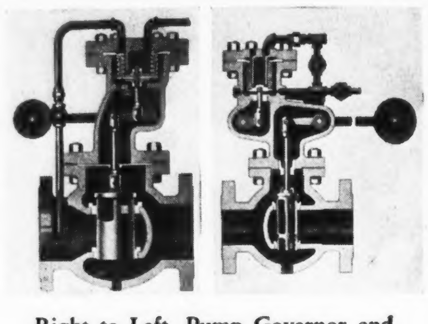
The MG-2 device is designed to operate in conjunction with suitable motor-operated mechanisms and is available for use on alternating-current circuits only. It has an electrically interlocked switch which is so connected that power cannot be turned on unless the protective unit is in operative condition.

The new PF-2 undervoltage device is of the solenoid and plunger type with an air bellows for time delay. The time can be varied from approximately one second to one minute. This device can be applied to certain types of oil circuit breaker operating levers.

Oil-Circuit-Breaker Undervoltage Device

Regulator and Governor Offer Advantages

New "Copes" pump governors and differential water-pressure regulating valves are now being marketed by the Northern Equipment Co., Erie, Pa. The governor is designed for installation on simplex, duplex or triplex pumps and on turbine- or motor-driven centrifugal pumps. According to the makers, it is suited for differential excess-pressure service for boiler feeding, constant-pressure service, differential reducing-valve service on motor-driven centrifugal pumps or relief-valve service on belt or gear-driven pumps and can be obtained for 250, 400, 600, 900 and 1,350 lb. standard for either horizontal or vertical lines.



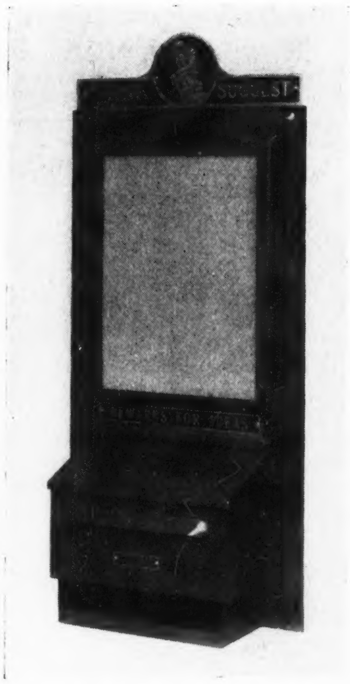
Right to Left, Pump Governor and Regulating Valve

The regulatory valve is designed to regulate the excess water pressure across the control valve of a feed-water regulator in a boiler feed line and may be obtained for the same pressures or lines as the pump governor.

New Suggestion System Keeps Interest Alive

Elimination of the slackening in interest on the part of employees is the main feature in the Morton Suggestion System, a development of the Morton Mfg. Co., Chicago. The system provides for presenting subjects on which suggestions are desired in the form of bulletins illustrated in color. By changing these every week, constant interest may be kept up and every problem with which the management is faced may be placed before the workers.

An attractive metal cabinet with a shelf for suggestion blanks and a large

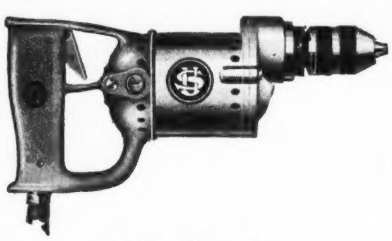


Stimulates Thought in Employee

metal frame for the bulletins is supplied. Suggestions for carrying out the administrative work in connection with the system also are supplied to purchasers. The system is now on the market and, according to the manufacturers, finds a place in almost every line of business.

Speed and Light Weight Feature New Drills

To meet the growing demand for a higher speed light weight $\frac{1}{4}$-in. portable electric drill, the United States Electrical Tool Co., Cincinnati, Ohio, now has two in regular production. One of these, known as the $\frac{1}{4}$-in. special direct-drive drill, operates direct on the armature shaft at a speed of 10,000 r.p.m. and weighs only 4 lb. The other, known as



Light and Speedy

the $\frac{1}{4}$-in. special gear reduction drill, operates at 2,000 r.p.m. and is only 2 oz. heavier.

A new feature of these drills is their keyless chucks. Another, according to the manufacturers, is their easy accessibility to close places. Both drills embody a universal motor that operates on alternating or direct current of 60 cycles or less, SKF ball bearings throughout, double silk insulated enameled armature wire, chrome nickel steel gears, one piece frame, commutator head and trigger switch.

Physical Effort Cut by Electrical Calculator

Calculators designed to insure positive key action and reduce actual physical effort on the part of the operator have been announced by the Burroughs Adding Machine Co., Detroit, Mich. The operator cannot short-stroke or otherwise misoperate a key, with the result that accuracy is insured. The

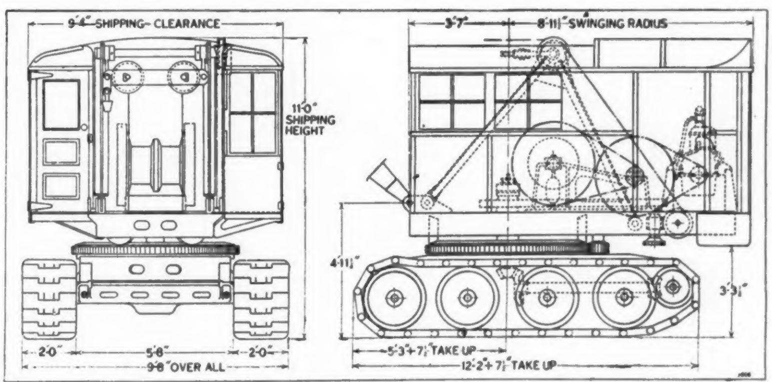
Insures Accuracy

new calculator, in ten-column totaling size, is similar in size and appearance to other Burroughs machines of this type and is equipped with an entirely inclosed motor operating on either a.-c. or d.-c. current.

Shovel-Crane-Dragline For Heavy Duty

The Link-Belt Co., Chicago, announces the addition of a heavy-duty $\frac{3}{4}$-cu.yd. size of crawler shovel-crane-dragline, known as the type K-25, to its line. It is asserted that this machine is rugged, fast and liberally powered. Gasoline, Diesel or electric drive may be obtained, as desired. As a shovel, it is equipped with a $\frac{3}{4}$-yd. struck-measure capacity dipper. It will handle a $\frac{3}{4}$-yd. bucket on a 40-ft. boom when working as a dragline or crane.

Construction Details



New Trolley Supplies

Turret type mine harps and pole-head castings, trolley wheels and feeder slings are among the new products now being manufactured by the Ohio Brass Co., Mansfield, Ohio. The harps may be obtained for either trolley or glider operation and have been considerably improved and strengthened, according to the manufacturer.

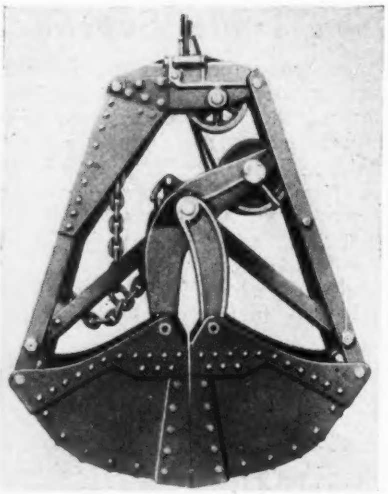
Feeder cable of 750,000-circ.mil size may now be hung with the new "Bull-

Trolley Products for Efficient Operation

dog" feeder sling, made of "Flecto" malleable iron, hot-dip galvanized. These slings were formerly made only in 500,000 or 1,000,000-cir.mil sizes. A new 5-in. trolley wheel also is being made for mine locomotives, and may be obtained for $\frac{1}{2}$-in., $\frac{5}{8}$-in. or $\frac{3}{4}$-in. axles.

Clamshell Buckets Have More Digging Power

Greater digging power is claimed for the new clamshell bucket manufactured by the Lakewood Engineering Co., Cleveland, Ohio, for use in all kinds of digging and excavating work, including deep-water dredging, handling quarried rock, rehandling or work in slag



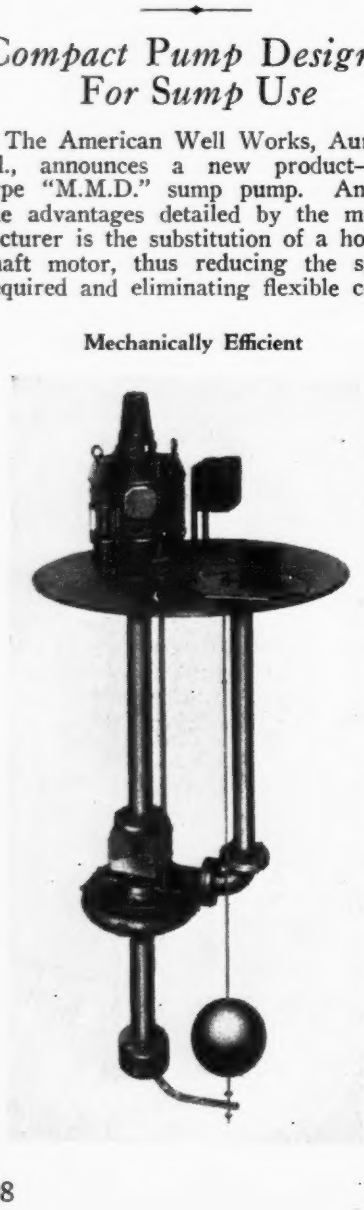
Greater Reach, Powerful Closing

dumps. Greater reach and concentration of closing power near the end of the stroke are features of its construction, according to the manufacturers. Capacity ranges from $\frac{1}{2}$ to 2 yd. and weight from 2,350 to 5,800 lb.

Compact Pump Designed For Sump Use

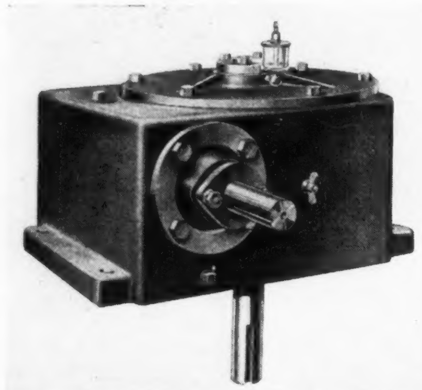
The American Well Works, Aurora, Ill., announces a new product—the type "M.M.D." sump pump. Among the advantages detailed by the manufacturer is the substitution of a hollow shaft motor, thus reducing the space required and eliminating flexible couplings and thrust bearings; also the high motor supports are eliminated and the alignment of pump and motor is not affected regardless of distortion of the cover.

Mechanically Efficient



Speed Reducer Stands Heavy Duty

An improved vertical type heavy-duty worm-gear speed reducer is announced by the D. O. James Mfg. Co., Chicago, Ill. This type of speed reducer, according to the manufacturers, is adapted to drives for mixers, agitators, disk feeders and other equipments that rotate on a vertical axle, and eliminates the necessity of obtaining a special vertical type motor.



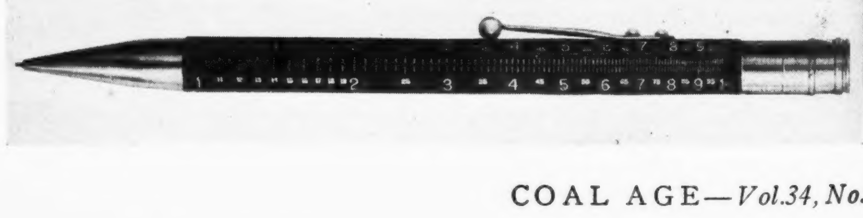
Built to Perform

Details of construction include a high-grade heat-conducting gray iron housing, Timken and Norma Hoffman roller bearings, special steels and bronzes and 20 to 30 deg. pressure angle teeth, the latter being standard, depending upon the number of teeth in the worm and gear.

Slide Rule Contained in Automatic Pencil

Rapid calculations can be made involving multiplication, division, percentages and proportion with sufficient accuracy for estimating purposes with the "Multi-Vider" pencil, according to the Ruxton Multi-Vider Corporation, New York City. This instrument is a combination slide rule and pencil $6\frac{1}{2}$ in. long and measuring $\frac{7}{16}$ in. across the flats. It is recommended by the makers for engineers, architects, contractors and business men who have estimates to make.

Makes the Calculations and Writes Them Down

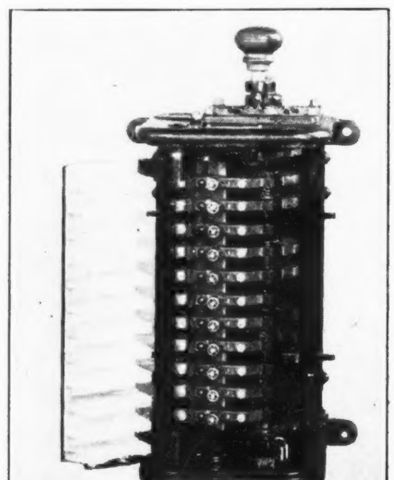


New Drum-Switch Line Now Available

A new line of primary resistance drum switches for use with squirrel-cage induction motors on small cranes, hoists and machine tools has been brought out by the General Electric Co. This switch is primary reversing, designed for wall mounting and can be furnished with a standard conduit box.

It is made in two forms: CR-3200-1250-B, for hoists where the motor is overhauled in the lowering direction, and CR-3200-1250-A, for hoists where the motor is not overhauled in the lowering direction.

The switches are built without operating mechanism, so that the user may select the type of operating equipment he desires. They may also be obtained with dust-tight covers. These switches are designed for operation on maximum primary voltages of 550, and the maximum horsepower rating for 2- or 3-phase service is 15.

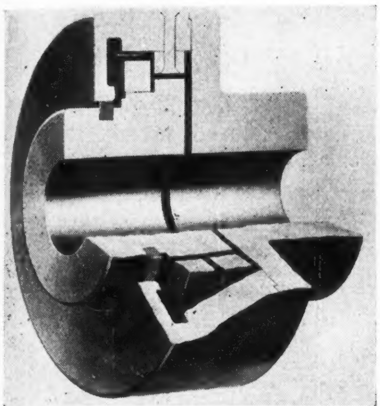


Drum Switch with Cover Off

Flex-Ring Coupling for Direct Drives

The increasing demand for a low price all-metal coupling to take care of the ordinary conditions encountered in a direct drive has prompted the T. L. Smith Co., Milwaukee, Wis., to design and perfect a new type of flexible coupling known as the Style "B" Flex-Ring. This is in addition to the Flex-Ring full-floating coupling.

In the Style "B" Flex-Ring flexibility is furnished by means of two long ring-shaped springs having an unusual degree



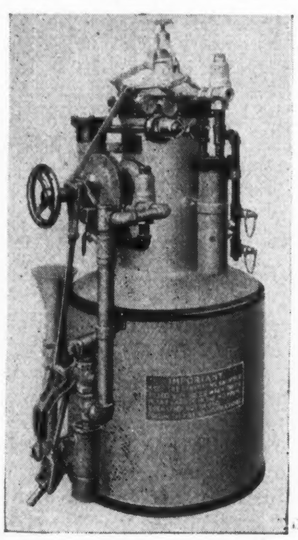
Said to Cost Little

of deflection. It is claimed by the manufacturer that these springs permit end-play of motor shaft without any sliding action, and effectively smooth out the shocks and vibrations in the drive. In addition, the Style "B" Flex-Ring is said to compensate for a great amount of both angular and offset misalignment without causing excessive bearing loads.

Cheap Welding Gas From Improved Generators

Three medium-pressure-type acetylene generators for welding and cutting have been placed on the market by the Oxweld Acetylene Co., New York City. The type MP-2 generator, built in either 50- or 100-lb. carbide capacity, replaces the two earlier generators, while the MP-3, having 300-lb. capacity, is entirely new. The type MP-2 generators use $\frac{1}{4}$ x $\frac{1}{12}$-in., and the MP-3 type $1\frac{1}{4}$ x $\frac{3}{8}$-in. carbide. The latter is designed as a large-capacity generator which will supply gas with minimum pressure fluctuation and maintenance expense. All three generators are suitable for supplying pressure-type or medium-pressure welding and cutting blowpipes.

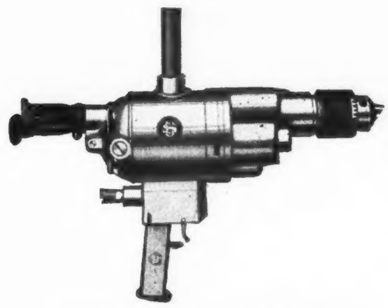
Sensitive Feed; Simple Construction



Light-Weight Drill Does Heavy Duty

In response to demands for a powerful low-speed $\frac{3}{4}$-in. heavy-duty drill for continuous service, the United States Electrical Tool Co., Cincinnati, Ohio, now has quantities in the hands of jobbers and supply houses.

A universal motor, operating on alternating or direct current of 60 cycles or less, pulls this drill at 350 revolutions



Power Plus Obtained Without Unnecessary Weight

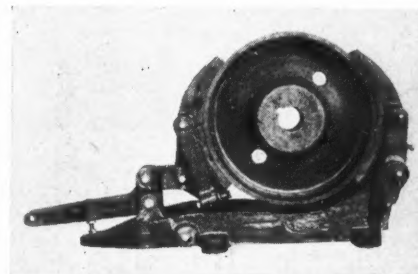
per minute load speed, according to the manufacturers. In all other respects it is typical of U. S. drills: SKF ball bearings; chrome nickel steel gears, hardened and running in grease; double silk-insulated, enameled, armature wire; one-piece aluminum body frame and commutator head; quick make, quick break, two-pole trigger switch and three-jaw screw-back chuck for straight shank drill bits, etc. The weight of this model is 27 lb.

Rock-Dusting Machine Is Light and Simple

According to the Chas. C. Steward Machine Co., Birmingham, Ala., the new Steward rock-dusting machine can be built as low as 24 in. above the rail. In addition it has a capacity of 3,000 lb. of dust per hour and is equipped with a high-speed ball-bearing blower driven by an electric motor. The machine weighs less than 400 lb. and can be pushed easily anywhere in the mine by hand. Its low height allows easy charging and the absence of gears, sprockets and chains makes for smooth and efficient operation.

New Brake Arranged for Lever Operation

Announcement has been made of an adaptation of the Type WB electrically operated brake made by the Electric Controller & Manufacturing Co., Cleveland, Ohio. The new brake is arranged

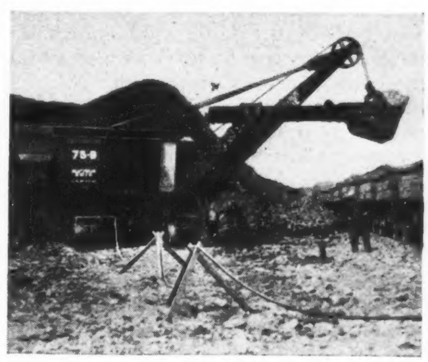


Ample Braking Power for Hard Service

for lever operation and is intended for operation of electric travelling cranes, lift bridges, electric hoists and other machinery requiring foot-operated or hand-lever operated brakes. This brake is equipped with unusually thick molded-asbestos brake shoes requiring renewal only after long periods of hard service.

General Utility Shovel

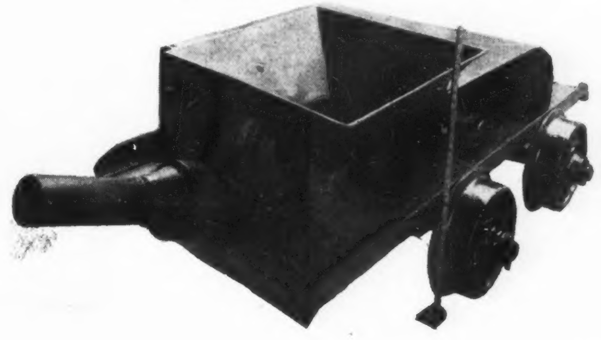
Bucyrus-Erie Co., South Milwaukee, Wis., announces a $2\frac{1}{2}$-yd. shovel designated as the "75-B." This machine is designed to fill the gap between the 2- and 3-yd. shovels and save money to



Made for Hard Going

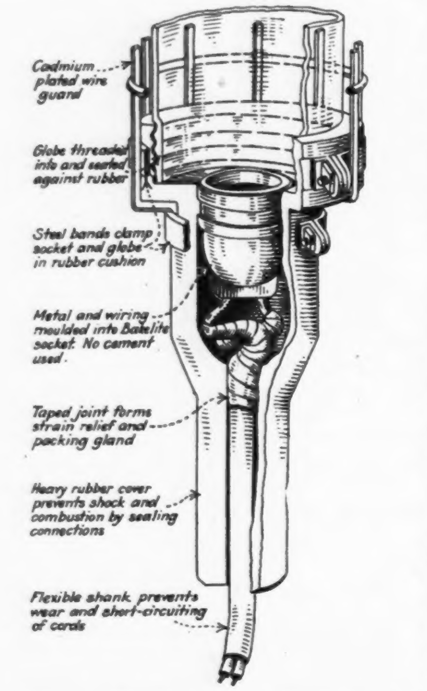
those who have formerly been forced to use the 3-yd. type. The shovel is designed for medium-sized quarries or construction jobs.

This Rock-Dusting Machine Is Easily Handled in the Mine



Extension Lamps Proof Against Explosion

"Protex" and "Vaprotex" lamps are being marketed by the Daniel Woodhead Co., Chicago, Ill. The "Protex" lamp protects the user against shock and the "Vaprotex" lamp is proof



Prevents Combustion and Explosion

against explosion. The accompanying sketch is of the latter and shows the various protective features as well as the excellent construction claimed by the manufacturer. The "Protex" lamp differs only in that it does not have the special gas-tight construction. However, the insulated handles, strain-proof connections, electric welded joints and heavy metal guard are included as in the other. It may be obtained with or without reflectors, and both lamps are equipped with a heavy-duty-type cord without braiding.

Brake Devices Provide For Special Conditions

Two new developments in the hoist brake field which have been perfected by the Ottumwa Iron Works, Ottumwa, Iowa, are an emergency trip device and an equipment for deferring emergency application of the brakes under certain conditions. These devices are used in connection with the "proportional braking system" developed by the Ottumwa works, which informs the hoist runner when his brakes start to take hold and to what extent they are doing so.

According to the company, the emergency trip device applies the brakes in precisely the same manner the operator would. On interruption of the power supply, the brake immediately settles to the drum and increases its braking effect at a predetermined rate. A solenoid is placed above an oil dashpot and operates through a lever to apply pressure on a valve stem by means of a compression spring similar to the one over the operator's valve. The drop of the solenoid and dashpot—which governs the braking effect—is controlled by a valve connected to the cam overwind, giving an application similar to that of the operator under ordinary conditions. It is asserted that the slowing-down and stopping of the cage is so delicate that the difference between hand and automatic control cannot be detected. A delicate setscrew adjustment allows exact control of the amount of braking in an emergency application.

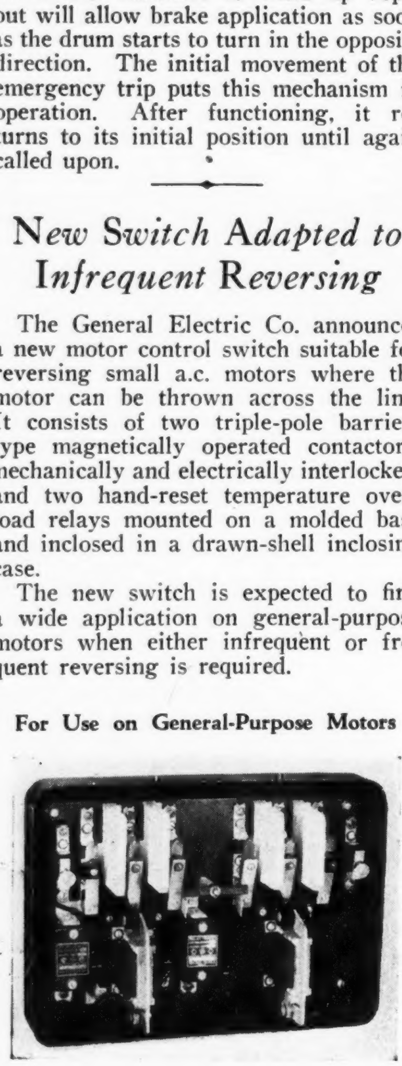
The deferred brake application mechanism is for use on slope hoists where there is danger of the trip overrunning the rope when the power fails and the hoist stops. This condition results in the trip running back and stopping with a jerk—often severe enough to break the rope or hitchings and precipitate the trip back to the bottom of the slope. The above-mentioned equipment will prevent brake application, even after the power has been cut off, as long as the drum will continue to wind up rope, but will allow brake application as soon as the drum starts to turn in the opposite direction. The initial movement of the emergency trip puts this mechanism in operation. After functioning, it returns to its initial position until again called upon.

New Switch Adapted to Infrequent Reversing

The General Electric Co. announces a new motor control switch suitable for reversing small a.c. motors where the motor can be thrown across the line. It consists of two triple-pole barrier-type magnetically operated contactors, mechanically and electrically interlocked, and two hand-reset temperature overload relays mounted on a molded base and inclosed in a drawn-shell inclosing case.

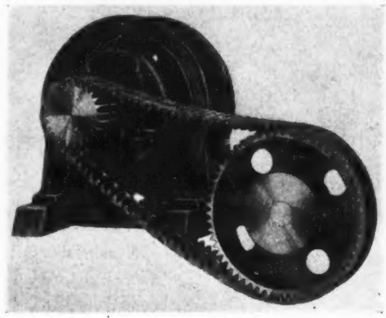
The new switch is expected to find a wide application on general-purpose motors when either infrequent or frequent reversing is required.

For Use on General-Purpose Motors



Expands Stock Range of Silent Chain Drives

To meet the demand for silent chain drives "direct from stock," the Link-Belt Co., Chicago, announces that the range has been increased to 60 hp. as

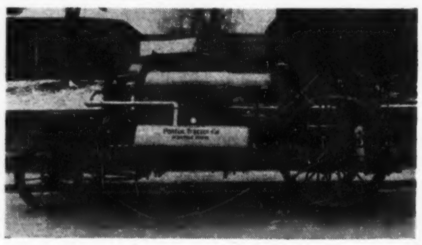


Drive Unit Can Be Quickly Obtained

against the 15-hp. limit carried previously. Practically any reduction may be obtained, according to Link-Belt, from 1 to 1 to 7 to 1.

Winches Now Provided For Tractor Units

A backfiller winch which operates in connection with the McCormick-Deering tractor has been announced by the Pontiac Tractor Co., Pontiac, Mich.



Serves a Variety of Purposes

The backfiller is designed to mount with either the compressor or the Lincoln arc welder made by this company, and when mounted with the compressor allows the operations of backfilling and tamping to be performed at the same time. This results in a single unit which is self-propelling and has the drawbar free for hauling equipment or other purposes.

Goggles Easily Applied

Accessories for welding and cutting recently added to the line of the Oxweld Acetylene Co., New York City, are the Oxweld cap and skeleton type helmet goggles. These goggles may be attached either to a strong fiber cap or lattice skeleton cap and may easily be raised or lowered with one hand. Both styles are provided with leather straps for head adjustment, are durable and furnish adequate protection.